ELECTRICAL CONSTRUCTION AND MAINTENANCE

NOVEMBER • 1950

50th Year

Mass production

Wiring methods from a large scale housing project.

Waste disposers

Installation problems encountered as a whole town adopts electric waste disposal.

Estimating

More unit data for accurate bids.

and Featuring

NECA convention report

News and pictures from the Los Angeles meeting.

A McGRAW-HILL PUBLICATION

Now Instant Start Fluorescent Home Lighting

Here's the secret of "trigger-start" ballasts: Special windings in the ballast are used for instantaneously pre-heating the lamp cathodes. As a result, the ballast's open circuit voltage becomes sufficient to strike the arc. ***Starters are completely eliminated!***

with GE "trigger-start" ballasts

***Here is instant starting** for standard fluorescent lamps in residential-type fixtures.* And it is accomplished merely by using a unique new ballast. With General Electric's revolutionary "trigger-start" ballast, any standard 20-watt lamp or any standard 32-watt Circline lamp starts with a flick of the switch.

These "trigger-start" ballasts are listed by Underwriters Laboratories, are exceptionally quiet in operation, and have the characteristic dependability that has made G-E ballasts "the brand in biggest demand." G-E ballasts make any fixture a better fixture. So, when you're specifying or buying fluorescent fixtures—or replacement ballasts—insist on General Electric "trigger-start" ballasts. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

This label on a fixture carton, or the familiar G-E ballast tag on a fixture, is your assurance of fine ballast performance. Buy—when you see the G-E ballast label or tag.

GENERAL ELECTRIC

R-E-A-C-H

- LIGHTS
- HEATERS
- SPRINKLER SYSTEMS
- BUS DUCT
- CONDUIT

without interruption of Plant Routine

The MURRAY Crows'nest "Reaches OVER"

No matter what your *reaching* problems, Murray has the answer—The Murray Crows'nest Ladder. Crows'-nests of varying heights, mounted on skids, caster trailers, carriages, trucks or other suitable bases are doing important up-in-the-air jobs indoors and outdoors speedily, efficiently, safely.

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3. **Full 360° rotation.**
4. **Rock-solid construction.**
5. **Many different mounts.**
6. **Practically numberless working positions.**
7. **Easy to handle.**
8. **Safe at all times.**
9. **Sturdy flat platform with levelling adjustment.**
10. **Compact when stored.**

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50 Years Service to the Electrical Industry

1250 ATLANTIC AVENUE, BROOKLYN 16, N. Y.

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Company_____

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Not to hire—to *please!* At every point in the design and manufacture of our steel switch and outlet boxes we're looking out for the Architect, Contractor, Wholesaler, and Dealer through whose hands they will pass. We make top *quality*, because that's the only safe way. We have built our line into genuine *completeness* because that means economy all along the way. And the Underwriters' Laboratories, Inc., listing tells the world our merchandise is right. We're here to serve you well and we're organized to serve you promptly.
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ALL-STEEL EQUIPMENT Inc.—800 Kensington Ave., Aurora, Illinois
"A BOX FOR EVERY NEED"

ELECTRICAL CONSTRUCTION AND MAINTENANCE

With which is consolidated Electrical Construction, The Electrical and Electrical Record...Established 1901

Published for electrical contractors, industrial electricians, engineers, consultants, inspectors and motor shops. Covering engineering, installation, repair, maintenance and management, in the field of electrical construction and maintenance.

50th Year—NOVEMBER, • 1950

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PROTECT YOURSELF WITH . . .

CERTIFIED BALLASTS

CERTIFIED BALLASTS usually outlast the life of a fluorescent lighting installation.

This assures customer satisfaction . . . protects you against complaints and costly replacements.

CERTIFIED BALLASTS have long, satisfactory life, assure rated light output and full lamp life because they are made to exacting specifications, then tested and checked by Electrical Testing Laboratories, Inc., an impartial authority.

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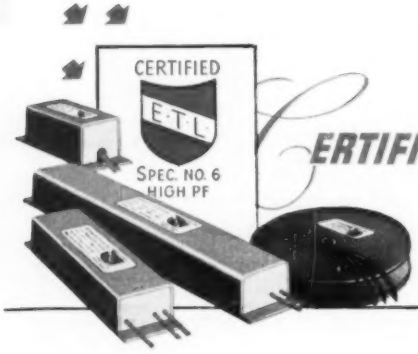
Complete information on the types of **CERTIFIED BALLASTS** available from each participating manufacturer may be obtained from Electrical Testing Laboratories, Inc., East End Avenue at 79th Street, New York, New York.

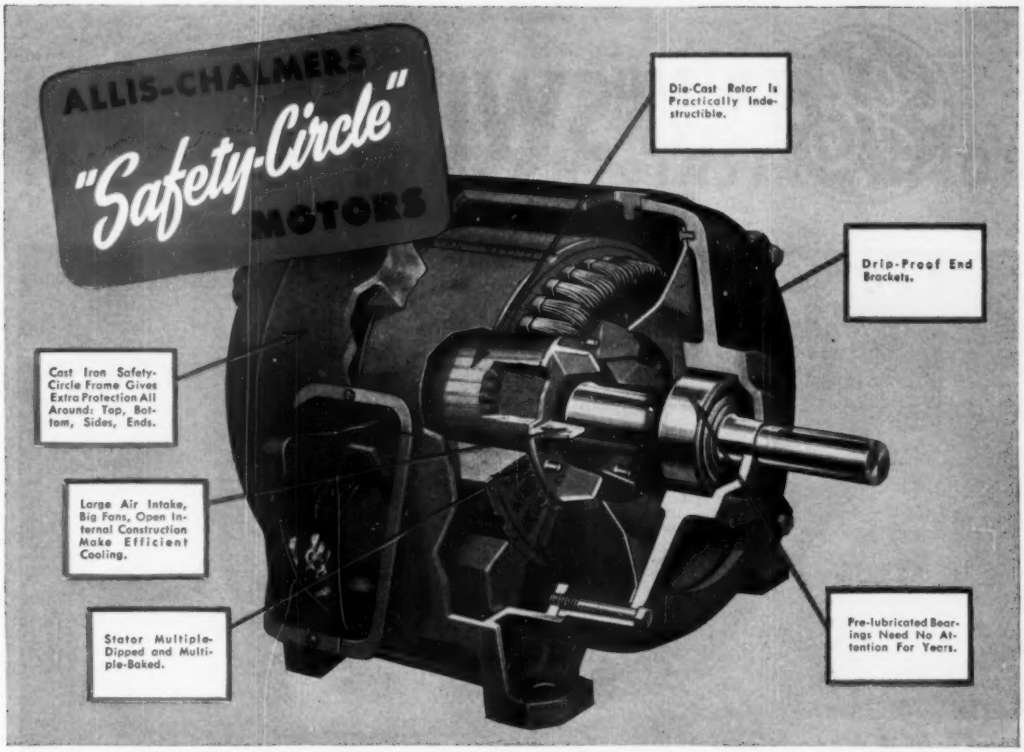
Participation in the CERTIFIED BALLAST program is open to any manufacturer who complies with the requirements of CERTIFIED BALLAST MANUFACTURERS.



CERTIFIED BALLAST MANUFACTURERS

Makers of Certified Ballasts for Fluorescent Lighting

2116 KEITH BLDG., CLEVELAND 15, OHIO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"Safety-Circle"
MOTORS
Die-Cast Rotor Is Practically Indestructible.
Drip-Proof End Brackets.
Cast Iron Safety-Circle Frame Gives Extra Protection All Around: Top, Bottom, Sides, Ends.
Large Air Intake, Big Fans, Open Internal Construction Make Efficient Cooling.
Stator Multiple-Dipped and Multiple-Baked.
Pre-lubricated Bearings Need No Attention For Years.

HOW SAFETY-CIRCLE

Means Motor Dependability

EXTRA PROTECTION means extra dependability. That's why Allis-Chalmers protects the working parts of the motor with the exclusive *SAFETY-CIRCLE*. Compare this motor with motors of less rigid construction. The *SAFETY-CIRCLE* motor will not distort in mounting or under strain. And you get the extra protection of drip-proof end brackets at no premium.

EXTRA PROTECTION INSIDE, TOO

Stator is multiple-dipped and multiple-baked in special insulating varnish. Rotor is die-cast aluminum. Stator is mounted in four longitudinal ribs which leaves plenty of air space between stator and frame. Large fans cast integrally with the rotor and ample air intakes keep temperatures well within rated limits. *Ball bearings are factory-lubricated and require no further attention for years.*

When you shop for motors, remember *SAFETY-CIRCLE* gives you *extra protection, extra dependability* and *lower operating costs.*

For details on *SAFETY-CIRCLE* advantages, see your A-C Authorized Dealer or Sales Office or write for Bulletin 51B6210B. Sizes 1 to 20 hp, 326 frames and smaller. *Safety-Circle, Texrope* and *Vari-Pitch* are Allis-Chalmers trademarks. A-3146

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Applied . . .
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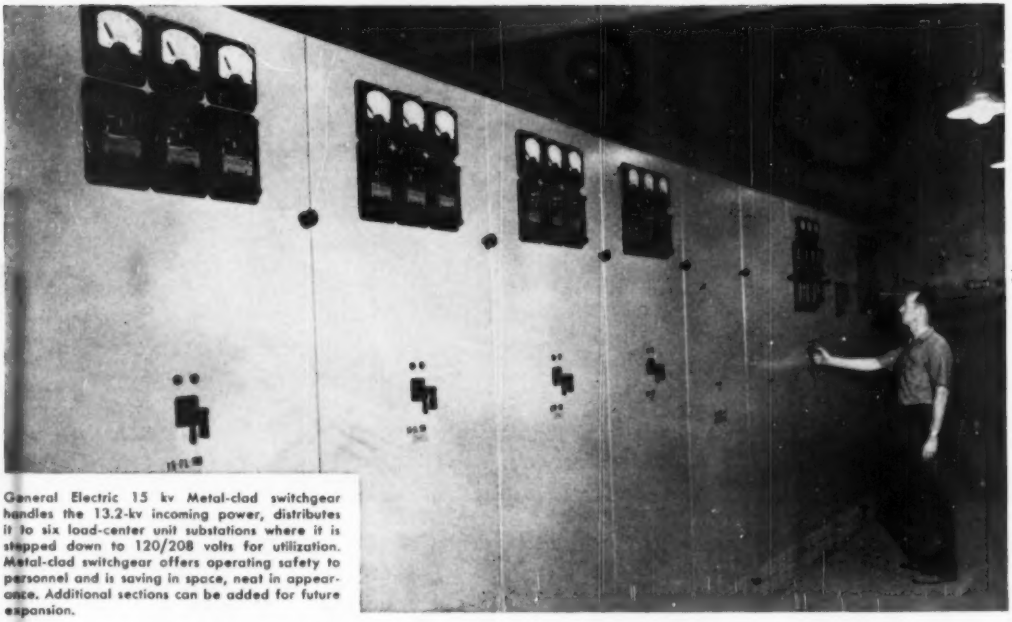
CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

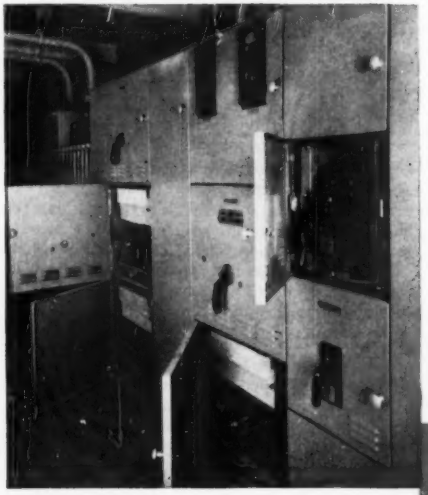
PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

METAL CLAD SWITCHGEAR



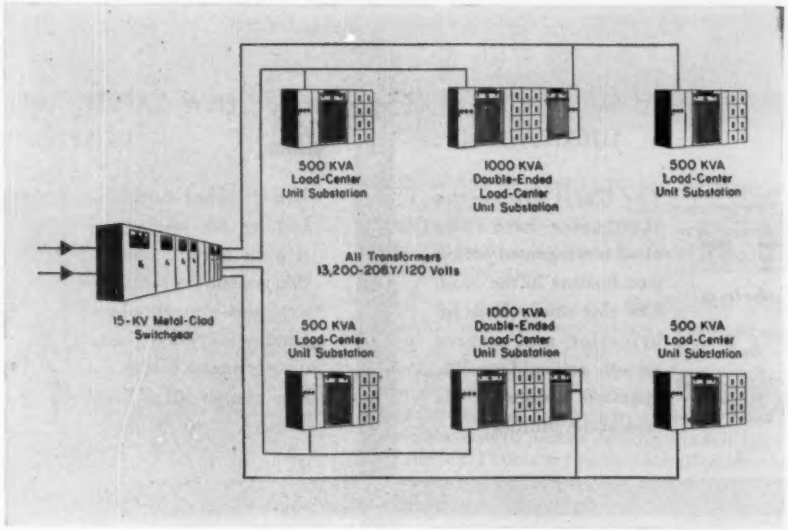
General Electric 15 kv Metal-clad switchgear handles the 13.2-kv incoming power, distributes it to six load-center unit substations where it is stepped down to 120/208 volts for utilization. Metal-clad switchgear offers operating safety to personnel and is saving in space, neat in appearance. Additional sections can be added for future expansion.

Load-center unit substations receive 13.2 kv power and step it down to 120/208 volts for utilization. Air switches on primary are easy to operate, blades are easy to see. Note entire load-center is metal-enclosed thus offering operating safety to personnel.



Low-voltage end of load-center unit substation showing air circuit breakers that have plenty of "IC" (Interrupting Capacity) to handle all short circuits. Breakers are of the drawout type, easily removable for inspection or maintenance.

HELPS PROTECT SERVICE AT TELEPHONE COMPANY INSTALLATION



In this installation General Electric Metal-clad switchgear receives the incoming 13.2 kv power and distributes it to six G-E load-center unit substations. Three load-centers, two single-ended units rated 500 kva and one double-ended rated 1000 kva, are located in the basement. Three other units of identical rating are on an upper floor. From these load-centers utilization circuits feed 208/120-volt power both upwards and down, and provide efficient, low-cost power at constant voltage wherever desired.

This installation is a complete General Electric project —one source of responsibility plus the very best in coordinated planning, engineering, manufacturing, and service facilities to give maximum savings and efficiency to the customer.

Be sure to see the "More Power to America" full-color sound slidefilm "Modern Industrial Power Distribution." Ask your G-E sales representative to arrange a showing for your organization.

MODERN INDUSTRIAL power distribution systems using G-E switchgear are applicable to any industrial plant or commercial building where you want proper voltage for top performance of equipment, an extremely flexible setup to take care of expanding or changing loads, adequate short circuit protection, safety to personnel, and low installation and maintenance costs.

INVESTIGATE TODAY the many advantages of using General Electric switchgear in *your* plant for efficient, flexible power distribution. Contact your G-E sales representative for further information—or write for the helpful bulletins listed below. *Apparatus Department, General Electric Company, Schenectady 5, New York.*

GEA-3083 Metal-clad Switchgear
GEA-4966 Low-voltage Metal-enclosed Switchgear
GEA-3592 Load-center Unit Substations
GEA-3758 Load-center Power Distribution

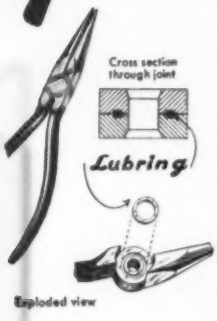
GENERAL ELECTRIC

860-40

NEWS FROM UTICA

Pioneering and improvements it will pay you to know about

1 PLIERS WITH BUILT-IN LUBRICATION . .



The finest pliers—the LUBRING line—have a ring of oil-impregnated porous iron floating in the joint. The ring slowly feeds lubrication and assures smooth action, long life. Standard equipment for several top utilities.

2 NEW SAFETY AND COMFORT IN SPECIAL HANDLES

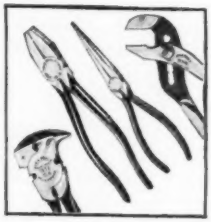
Heavy rubber vulcanized handles for insulation—slip-on plastic handles that are non-burning, non-explosive—dipped plastic handles for comfort—handle springs for ease in use. For almost all UTICA tools.

3 WRENCHES THAT LAST TEN TIMES AS LONG . .

Adjustable wrenches with electronically hardened jaw *surfaces*. Resist burring and nicking. Last up to 10 times as long. Their thin pattern was designed to reach the hard-to-get-at places—with *plenty* of strength!

4 80 TOOLS . . 151 SIZES. THE RIGHT TOOL FOR YOUR NEED

You get *exactly* what you want from UTICA! A full line of pliers and adjustable wrenches. Every tool checked in every step of manufacture, and *tested*. For long-run economy in your production line.

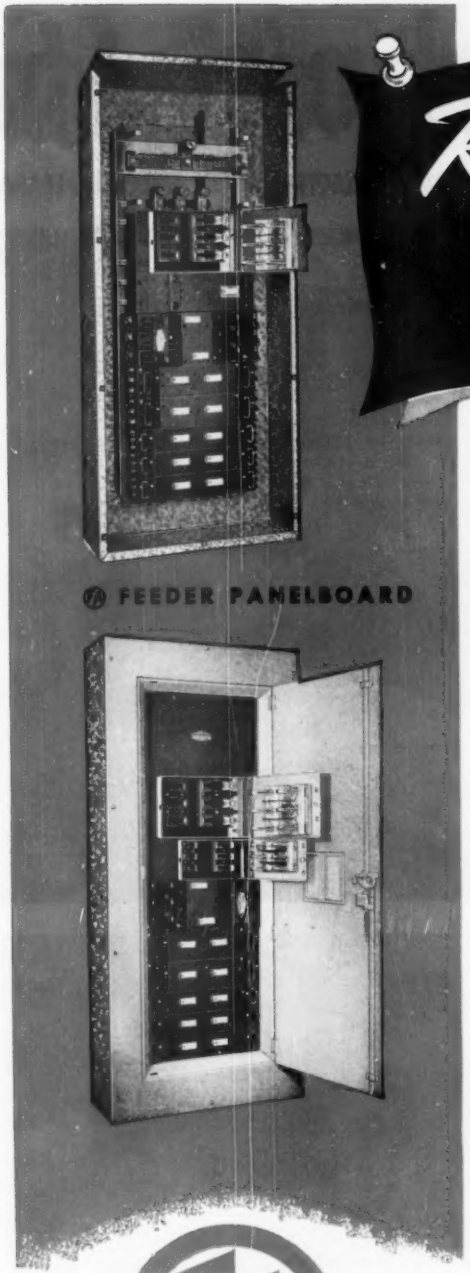


Utica Drop Forge & Tool Corporation, Utica 4, N. Y.

BETTER PLIERS FOR EVERY PURPOSE

It pays to use U TI CA quality tools

AND THE WORLD'S BEST TOOLS ARE MADE IN U. S. A.



Re-designed inside and out

Ⓕ FEEDER PANELBOARD

LESS SPACE IS REQUIRED for the same panelboard requirements in the *re-designed* Ⓕ FEEDER PANELBOARD . . . without sacrificing such popular Ⓕ features as generous wiring space and ease of installation.

This improved, compact Ⓕ FEEDER PANELBOARD is built of standardized units and assembled as required for specific application. Four standardized widths, 10 standardized heights and 3 standardized depths of boxes meet any requirement. Boxes are shipped from stock . . . with removable ends to permit drilling conduit openings on the job. Panels are readily installed after boxes are in position.

Two dependable Ⓕ Switches . . . the Ⓕ PULFUZ-SWITCH and the Ⓕ KLAMPSWITCHFUZ . . . make these feeder distribution panelboards the finest in safety and efficiency. Both types combine switch and fuse in one unit so that current is OFF when the door is opened, or the fuse carrier removed. This makes replacement of fuses safe . . . quick . . . simple.

In operation, the switch blades make pressure contact with the fixed switch parts, assuring full current-carrying capacity. Silver-plated contact parts insure low resistance to current flow, and reduce heating.

Ⓕ PULFUZSWITCH capacities: 30, 60 and 100 amps., 250 volts AC or DC; 30 and 60 amps., 600 volts AC, 2, 3 and 4 pole.

Ⓕ KLAMPSWITCHFUZ capacities: 30 to 600 amps., 250 volts AC or DC; and 30 to 200 amps., 600 volts AC in 2, 3 and 4 pole types, single or double throw.

For more information about the *re-designed* Ⓕ FEEDER PANELBOARD, talk it over with your Ⓕ Representative (he's listed in Sweet's).

FA TRADE MARK

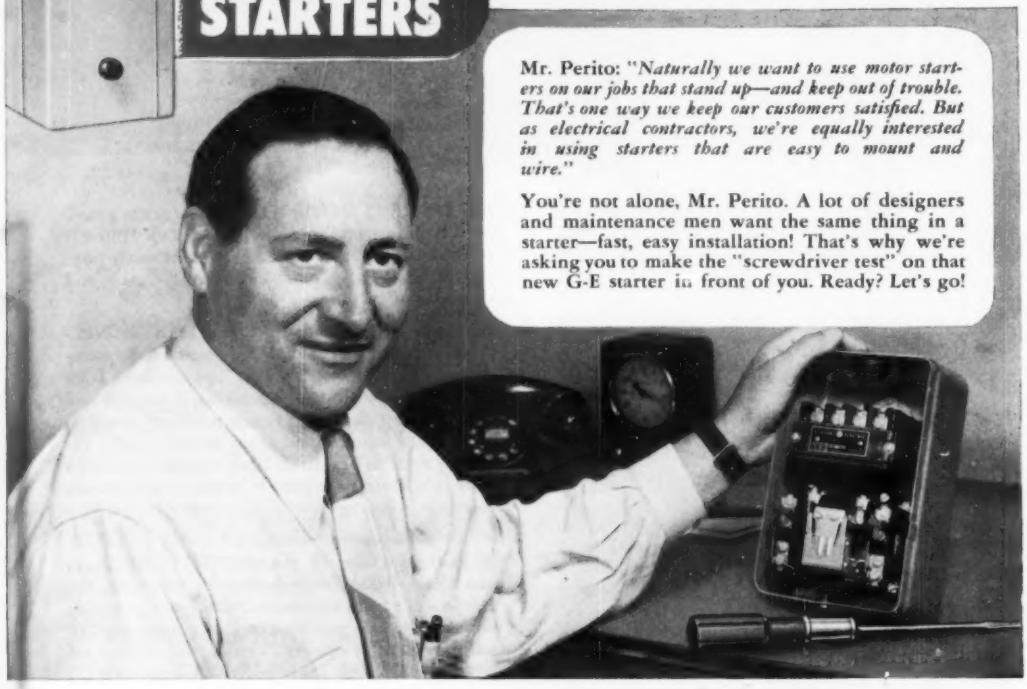
Frank Adam Electric Co.

ST. LOUIS 13, MISSOURI

Makers of BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETSP

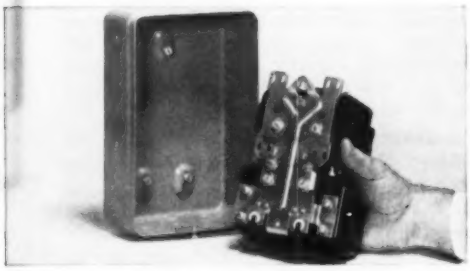
MOTOR STARTERS ...easier to

T.G. PERITO, ELECTRICAL CONTRACTOR, LEARNS



Mr. Perito: "*Naturally we want to use motor starters on our jobs that stand up—and keep out of trouble. That's one way we keep our customers satisfied. But as electrical contractors, we're equally interested in using starters that are easy to mount and wire.*"

You're not alone, Mr. Perito. A lot of designers and maintenance men want the same thing in a starter—fast, easy installation! That's why we're asking you to make the "screwdriver test" on that new G-E starter in front of you. Ready? Let's go!



1 Mr. Perito: "*How is this contactor mounted in the case?*"
By means of keyhole slots you see in the contactor base, Mr. Perito. After you've mounted the empty case on the wall or a machine, you locate the keyhole slots over the mounting screws and the contactor slips into place!

2 Mr. Perito: "*Lots of knockouts, I see!*"
You'll find these on every side of the case—more than enough to give you faster, neater installations. Plenty of room on the inside, too, and notice how the light grey finish on the inside gives you plenty of reflected light!

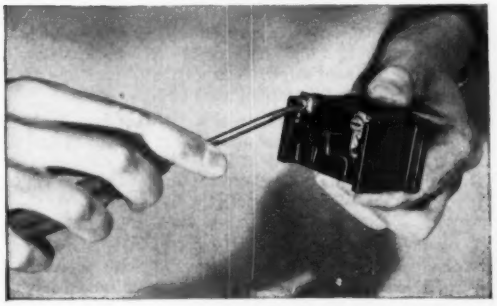
GENERAL ELECTRIC

730-18

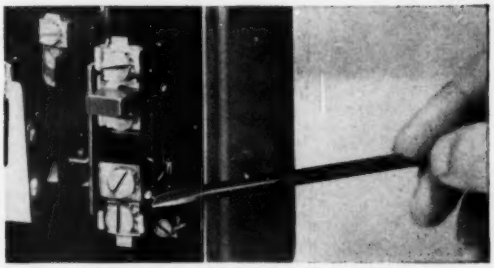
install for these 6 reasons

ABOUT THESE IMPORTANT FEATURES WITH THE "SCREWDRIVER TEST"

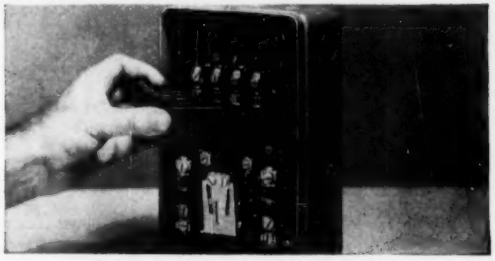
3 Mr. Perito: "*Are all the terminals easy to get at?*" Every one of them is *up front* where it's easy to get at, and wire. And they're *big* terminals with panhead screws and saddle-type connectors that ride up with the screw head. The stripped wire simply slides into place and is easily secured with a turn of your screwdriver.



4 Mr. Perito: "*Tough-looking coil! Is it new?*" Right! It's called the "Strongbox Magnet Coil" and it's an exclusive with the new G-E starter line. Feel how solid it is! If your electrician's screwdriver slips, it can't hurt the windings—they're safely locked in a block of molded plastic. And oil, dust or water can't get at them, either!

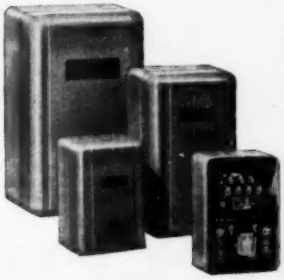


5 Mr. Perito: "*How do I set the overloads?*" Easy—and you don't have to take the starter apart to do it. Flip that little lever and it's on "Automatic." Flip it back and it's on "Manual." Heaters are in the front, can be changed without disturbing any wiring.



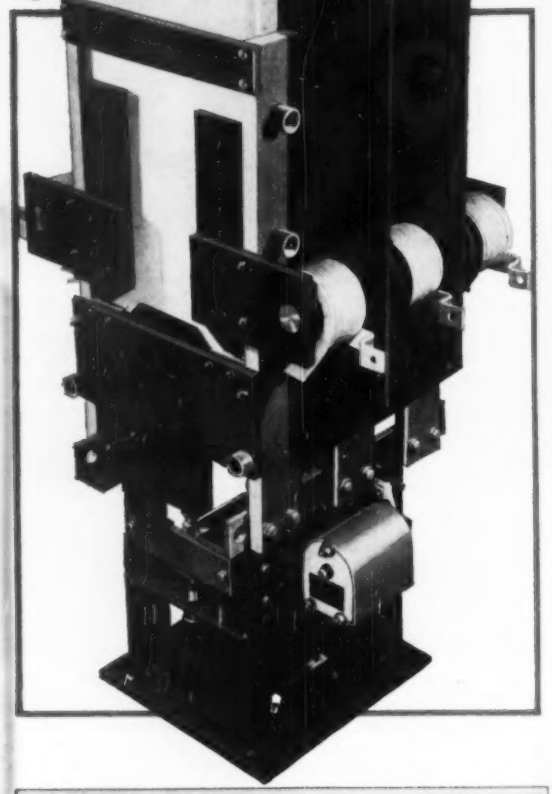
6 Mr. Perito: "*What about maintenance?*" Once this new G-E starter is installed, it *stays* installed. There's no need to remove the case for ordinary maintenance or even to replace or reverse contacts. Just remove the arc chute and there are your terminals.

WHY DON'T *YOU* "BUY ONE AND COMPARE?"



See for yourself why this new line of G-E motor starters lasts longer, costs less to install than almost any other starter you can buy. Your G-E representative or authorized G-E agent or distributor can supply you from stock in NEMA sizes 0, 1, 2 and 3 for a-c motors up to 50 hp. For a complete description, write for Bulletin GEA-5153. *Section 730-18, Apparatus Dept., General Electric Company, Schenectady 5, New York.*

First 50,000 KVA AIR CONTACTOR



ALLIS-CHALMERS
TYPE 256 CONTACTOR
FOR 2300 TO 5000 VOLT MOTOR CONTROL

Maximum Rating of New Contactor

400 Amperes	50,000 kva
60 kv impulse	19 kv @ 60 ~ for one min.
1500 hp @ 2500 V.	2500 hp @ 5000 V.

25,000 amperes through current for 30 ~.

THE ALLIS-CHALMERS Type 256 Air Contactor series has been expanded to include a 400 ampere, 5000 volt contactor. It's the *first* air contactor with this high rating! The *first* air contactor to control 5000 volt motors to 2500 hp . . . 3000 hp at unity power factor!

This new contactor is designed to fit your control system into your distribution system in any one of these three ways:

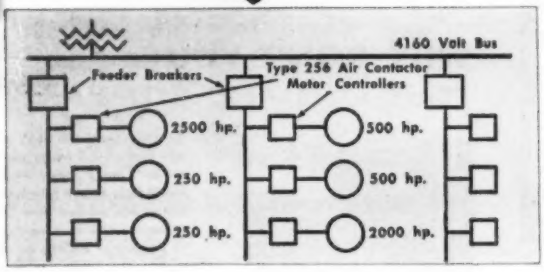
1. In conjunction with back-up breakers rated up to 25,000 amperes interrupting capacity; 150,000 kva at 4600 volts, 100,000 kva at 2300 volts.
2. With non-current limiting power fuses rated 250,000 kva and permitting instantaneous peaks to 54,000 amperes for one cycle.
3. Without back-up protection, on systems where faults cannot exceed 50,000 kva.

This 400 ampere air contactor will withstand short circuits up to 150,000 kva for 30 cycles. It provides a wide margin of safety when used with back-up circuit breakers with interrupting time of eight cycles.

Now, for the first time, this contactor provides both low initial cost and low maintenance cost for control of motors above 1000 hp at 2300 volts . . . above 1,300 amperes initial starting current. And it's recommended for continuous service on severe duty cycles!

For a contactor, a single starter, or an entire control group . . . to control squirrel-cage, wound rotor or synchronous motors . . . check with Allis-Chalmers. Call your nearby A-C representative or send for bulletins 14B6410 and 14B7303. A-3201

ALLIS-CHALMERS, 930A SO. 70 ST.
MILWAUKEE, WIS.



This new contactor, with its 25,000 ampere through current rating, permits cascading motor starter with a back-up breaker to protect a group of motors on systems up to 150,000 kva, 5000 volts.

ALLIS-CHALMERS

another aid to
BETTER PLANNED LIGHTING

Everyone who specifies, recommends, buys or sells industrial lighting equipment should have a copy of the new RLM Bulletin 1050. This bulletin brings you an up-to-date check list of all manufacturers of RLM-labeled lighting units and the types of RLM-certified units made by each. It is intended to facilitate the specification of quality lighting units so essential to the success of any Planned Lighting Program.

Featuring an easy-to-use chart, the bulletin enables you to quickly determine: (1) whether or not a certain size and type of unit is RLM certified; (2) the names of all manufacturers who make RLM-labeled units of the type and size desired; (3) the names of manufacturers and the types of lighting units which they currently have on submittal to the Electrical Testing Laboratories for test and certification.

The bulletin supplements the RLM SPECIFICATIONS BOOKLET which contains all RLM Specifications in effect as of March, 1950. When used in conjunction with the Specifications Booklet, the bulletin will prove of important assistance in the procurement of lighting equipment that meets nationally recognized standards of quality and performance.

For your complimentary copy of both the new Bulletin and the 44-page Specifications Booklet, mail coupon or write RLM STANDARDS INSTITUTE, Suite 819, 326 W. Madison Street, Chicago 6, Ill.

RLM STANDARDS INSTITUTE
INCORPORATED

The letters RLM stand for Reflector and Lighting Equipment Manufacturers

RLM STANDARDS INSTITUTE
Suite 819, 326 W. Madison Street
Chicago 6, Illinois

Please send me, without cost or obligation, a complimentary copy of both the RLM BULLETIN 1050 and the 44-page RLM SPECIFICATIONS BOOKLET.

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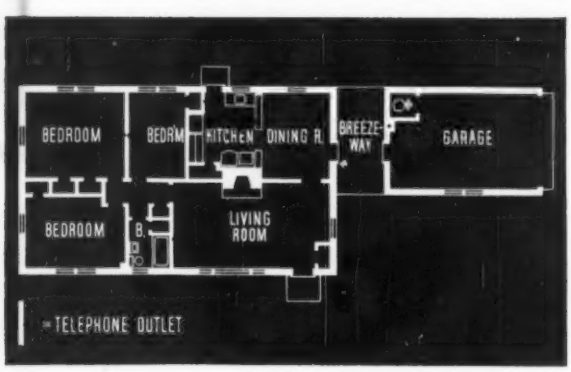
R5245

W. W. MEIRS, *Designer*

RIGHT FROM THE START...TELEPHONE OUTLETS



It's both practical and profitable to provide for telephones while a house is being built. Practical because it protects the beauty of walls and woodwork by keeping telephone wires concealed. Profitable because it means more business for you.

Telephone outlets can be made an integral part of any house — with little effort and at little cost. A few lengths of pipe or tubing leading to outlet boxes are usually sufficient for the average house. Placed inside the walls during construction, they carry the wires unseen to the outlets, thus protecting the beauty of walls and woodwork.

BELL TELEPHONE SYSTEM

Remember—NO ELECTRICAL CONTRACT IS REALLY COMPLETE UNLESS IT INCLUDES RACEWAYS FOR TELEPHONE WIRES.

what are the FACTS ABOUT SAFETY SWITCHES?

1 IS "INTERNAL HEATING" IN SAFETY SWITCHES IMPORTANT?

Engineering research fully authenticated by outstanding authorities shows "internal heating" in Safety Switches to be the principal cause of Safety Switch failures.

2 HOW DOES "INTERNAL HEATING" CAUSE SAFETY SWITCH FAILURES?

By literally baking the life out of Safety Switch parts. It causes insulating materials to disintegrate, metal parts to warp and corrode, so switches either become inoperative or "burn up" through inability to carry the load.

3 WHAT CAUSES "INTERNAL HEATING" IN SAFETY SWITCHES?

In properly constructed Safety Switches, fuses are responsible almost exclusively for "internal heating." This is no criticism of fuses; it is unavoidable. Any fuse carrying its rated load *must* be near its melting point if it is to perform properly when an overload occurs. Any metal operating *near* its melting point must be *hot* and fuse links *are* hot, with temperatures running as high as 700 degrees Fahrenheit.

4 HOW CAN THE TROUBLE FROM "INTERNAL HEATING" BE OVERCOME?

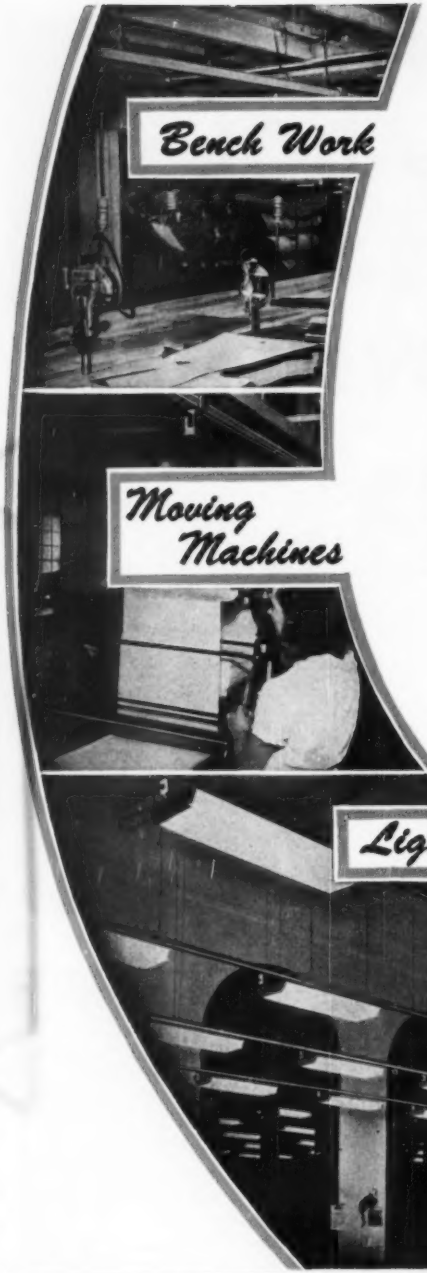
As the adequate enclosure so fundamental to *safety* in Safety Switches makes thorough venting of the trapped heated air impossible, the only escape from the ravages of "internal heating" can come through selecting materials for the internal structure and designing this structure to successfully withstand the unavoidable heat conditions to be met in service.

CUTLER-HAMMER
SAFETY SWITCHES
C-H

5 WHAT SAFETY SWITCHES AVOID "INTERNAL HEATING" TROUBLES?

Cutler-Hammer Safety Switches. Cutler-Hammer Safety Switches were completely redesigned *ten years* ago to beat "internal heating" when engineering research clearly indicated the need for *such* Safety Switches. Nine years of experience shows the Cutler-Hammer claim of better Safety Switch performance far more than a mere promise; it is a proven *fact*. Ask the men who use them. CUTLER-HAMMER, Inc., 1306 St. Paul Ave., Milwaukee 1, Wis.

WHAT—*no wires?*



That's about it when Electric Feedrail, the modern, totally enclosed, electrical distribution system is used.

One vertical cable connected to an overhead trolley, through an Ever-Lok trouble-proof connector—no wires to trip over, snag or tangle, no exposed circuits—and you can move the equipment along the line without disconnecting.

Feedrail is also ideal for cranes and hoists, moving test lines and lighting. In fact, anywhere electrical equipment moves. You can save wiring costs, maintenance time, speed up your plant, and make it electrically safe at the same time.

Ask for technical data and bulletins applying to your specific applications.

ELECTRIC FEEDRAIL

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc.

125 BARCLAY STREET • NEW YORK 7, N.Y.

Guard Against Atmospheric Hazards...

WITH

Century PROTECTED MOTORS

Drip Proof

Splash Proof

Totally Enclosed Fan Cooled

Explosion Proof

ALTERNATING CURRENT MOTORS

POLYPHASE

Squirrel Cage Induction—1/6 to 400 H.P.
Wound Rotor Motors—1 to 400 H.P.
Synchronous Motors—20 to 150 H.P.

SINGLE PHASE

Split Phase Induction—1/6, 1/4, 1/3 H.P.
Capacitor—1/6 to 20 H.P.
Repulsion Start, Brush Lifting, Induction—1/2 to 20 H.P.

DIRECT CURRENT MOTORS

1/6 to 300 H.P.

GENERATORS

AC, .63 to 250 KVA
DC, .75 to 200 KW

GEAR MOTORS

1/8 to 1-1/2 H.P.

MOTOR GENERATOR SETS

AC to DC, AC to AC
DC to DC, DC to AC

Open Protected, Splash Proof, Totally Enclosed Fan Cooled, Explosion Proof.

Ball Bearing motors are factory lubricated for several years' normal service. Bearing housing construction permits easy re-lubrication when unusual service demands it.

CE-673

To guard your production against the destructive effects of atmospheric hazards, Century offers four types of protective motor frames.

DRIP PROOF—meets the requirements of most installations. Use it where operating conditions are relatively clean and dry. Top half of the frame is enclosed to keep out falling solids and dripping liquids.

SPLASH PROOF—keeps splashing liquids out of the motor even when the frame is washed with the full force of a hose. Use Century Splash Proof motors indoors or outdoors.

TOTALLY ENCLOSED FAN COOLED—resists the hazards of abnormal concentrations of dusts, powders, grit, oil mists, acid and alkali fumes.

EXPLOSION PROOF—protects life and property in atmospheres charged with explosive dusts or vapors.

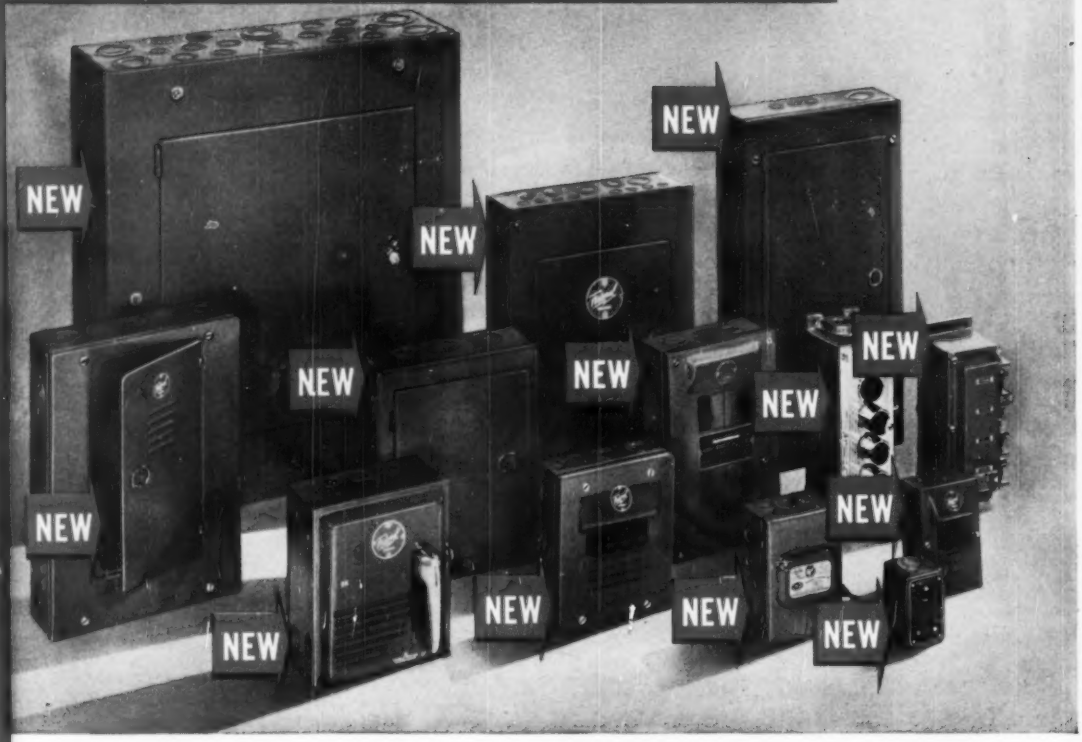
The properly selected protection with the wide variation of starting torque characteristics to choose from provides long operating life and improves the production of the driven equipment.

Century motors are available in a wide range of kinds and types—in sizes from ⅓ to 400 horsepower—for single phase, polyphase and direct current applications.

Specify Century motors for all your electric power requirements.

CENTURY ELECTRIC CO. 1806 Pine St. • St. Louis 3, Mo.
Offices and Stock Points in Principal Cities

FEDERAL'S FIRST!



and here are the reasons why!

IN LESS THAN TWO YEARS Federal Noark has brought electrical contractors the most profitable line of new developments ever achieved in low voltage distribution equipment. Fully a dozen times in that period Federal has given you *new* opportunities to start installing greatly superior devices and to make important savings of both labor and money.

So broad is the scope of these latest and most advanced designs that, no matter what your specifications call for, you will find exactly the right Federal Noark equipment for every need. Most of it will simplify your wiring jobs . . . and Federal's manufacturing precision and quality control always assure devices of maximum dependability, efficiency and service life.

See for yourself the special advantages of Federal Noark's complete lines at your Federal Distributor's. You'll quickly understand how Federal's leadership in bringing out new and superior products means valuable savings, larger profits, and more attractive installations.

FOR EXAMPLE, LOOK AT THESE NEW FEDERAL NOARK PANELBOARD FEATURES!

NO MORE DELAYS!

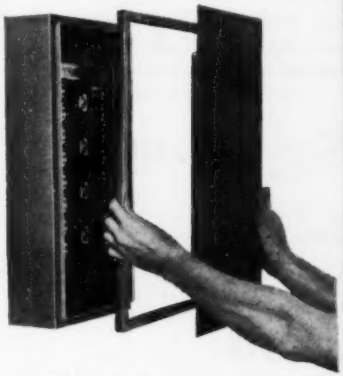
The new Flexunit line of Plug-In Distribution Panelboards enables your Federal Noark distributor to assemble any desired combination of fusible switches in a few minutes. And the necessary standard parts are so few that the distributor can always have them in stock and give you almost instant panelboard delivery. Federal Flexunit Panelboards abolish all the former delay caused by waiting for factory assemblies.

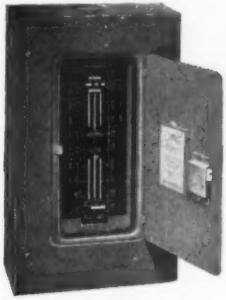
All essential elements of the new Federal Flexunit have proved their outstanding merit through many years of service. The plug-in stabs are a highly practical feature of both Federal Noark Bus Duct and Control Center plug-in units. The Wurdack Pull Switch units are known and accepted as standard, everywhere.

"DOUBLE-PURPOSE" ENCLOSURE

Now the whole Federal Noark line of NTPS Panelboards comes in the handy "combination" enclosures for either flush or surface mounting . . . even the new low priced 16- and 20-circuit NTPS panelboards! They are shipped from the factory ready for surface installation. For conversion, you simply discard the picture-type frame – and the NTPS is ready for a remarkably neat flush mounting job.

Federal Noark brings you 16- and 20-circuit NTPS panelboards at exceptionally low prices. The new NTPS-316 and NTPS-320 have the same sturdy, compact, dependable construction that has made NTPS today's most popular line of tumbler switch panelboards.





CIRCUIT BREAKER PANELBOARDS
at fuse box prices

From a choice of only two Stab-lok Panelboard Enclosures and 15, 20, 30, 40, and 50 amp. Circuit Breakers, either single pole or simultaneous trip double pole, you can now meet any single phase panelboard specification up to 20 circuits, in a few seconds. The remarkable new Stab-lok System is extremely flexible and far more economical than any other . . . enclosures are the exclusive Federal "combination" type . . . breakers are the self-locking, plug-in Stab-lok design.

The exclusive new STAB-LOK Circuit Breaker has an improved co-operative thermal-magnetic trip action. Harmless momentary current surges – as when a motor starts – are permitted to pass, but the circuit is broken at once when there are shorts or dangerous overloads.

SEND FOR A COPY OF OUR NEW PRODUCTS BULLETIN

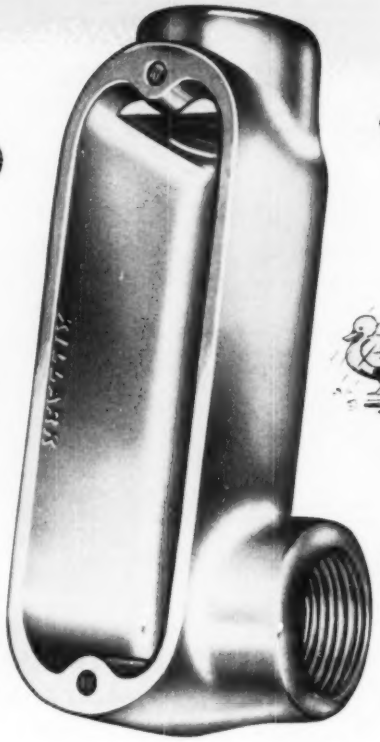
FEDERAL ELECTRIC PRODUCTS COMPANY, 50 PARIS ST., NEWARK 5, NEW JERSEY

FEDERAL NOARK
PANELBOARDS

Complete line of Federal Electric Products includes Motor Controls, Safety Switches, Service Equipment, Circuit Breakers, Panelboards, Switchboards, Control Centers, Bus Duct ★ Sales Offices in principal cities.

Talk About Advantages!

...talk about KILLARK Die-Cast* Alumalloy Fittings...



1. STRONG!

Alumalloy is malleable—built to withstand shocks and strains *far beyond* actual job requirements.

2. LIGHT!

Alumalloy has 60% less weight than cast iron. Easier to handle.

3. SMOOTH!

Satin-like finish of Killark fittings—inside and out—prevents wire-skinning, insures proper insulation.

4. UNIFORM!

Perfect fit every time. Precise, clean-cut threads simplify installation.

5. WEATHERPROOF!

Non-corrosible! Can't rust! 10 year weather-exposure tests have left Alumalloy fittings unaffected and rust-proof *clear through!*

6. POPULAR!

Killark fittings are already accepted by thousands of satisfied users—with more and more turning to these time- and trouble-saving advantages.

Thoroughly tested and approved in the field, the new Killark fittings and fixtures are a revolutionary climax to years of careful metallurgical research. Made of special aluminum alloy, and die cast under 10,000 lbs. pressure, they offer a new combination of high-strength, safety, durability, plus long non-corrosive life—features never before attainable in one fitting.

*Pat. Pending

Send for Killark Catalog

K KILLARK ST. LOUIS *Killark*

ELECTRIC MANUFACTURING COMPANY

Vandeventer and Easton Aves. St. Louis 13, Missouri

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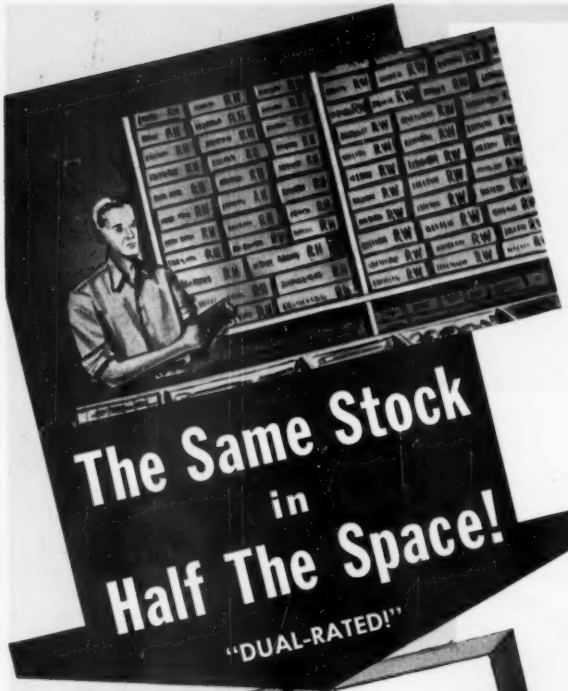


You Can SAVE Space and Reduce Inventories

with

TRIANGLE'S "DUAL-RATED" WIRE

Can Be Used as Either Type RH or RW
You no longer need two types!

Here's something new—something really new! It's Triangle's "Dual-Rated"—suitable for use in dry locations at 75° C or in wet locations at 60° C. Underwriter's Approved.

Think of the money you save in reduced inventories!

Think of the space you save!

Think of the confusion and the headaches you avoid!

Size #14, Size #12 — right up to 1,000,000 CM — you only need one type.

"DUAL-RATED!"

No need to order two of each size.

UNDERWRITER'S APPROVED!

Underwriter's Laboratories Inc. has approved the use of Triangle's "Dual-Rated" in either RH or RW applications.

Why Buy Two— When ONE Will Do?

Where it's HOT —

Where it's WET —

You no longer need two types —

Use "Dual-Rated"! It's a remarkable wire. Available in sizes #14—1,000,000 CM. In sizes #14 through #6, the cover is Triangle's revolutionary Glazon—the toughest, easiest-to-work cover on the market.

It's the insulation that Counts!

This remarkable new Triangle insulation is expertly compounded to stand up under the extremes of heat or moisture (RH at 75° C, dry locations; RW at 60° C, wet locations). It incorporates the qualities of the old Type RH and Type RW insulations.

In the long run — you'll save — and get it faster — from a Triangle Distributor

TRIANGLE CONDUIT & CABLE CO., INC.

1908 JERSEY AVENUE • NEW BRUNSWICK, NEW JERSEY

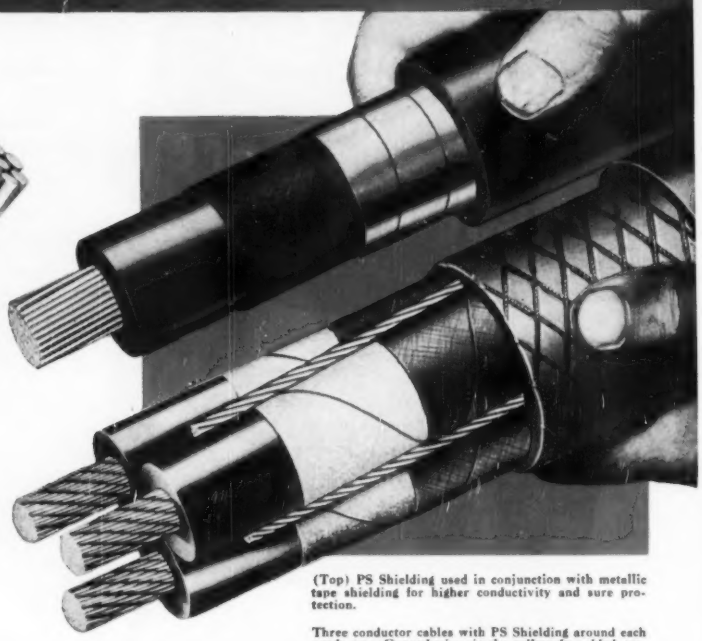
IT *MUST* BE RIGHT!

"GLAZON" BUILDING WIRE • BARE WIRE • ARMORED CABLE • GLAZON" NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE, SERVICE DROP, VARNISHED CAMBRIC BRAIDED OR LEADED, TRIOPRENE TRENCH, POWER AND PARKWAY CABLES • RIGID CONDUIT HOT-DIPPED GALVANIZED • ELECTRIC METALLIC THIN WALL CONDUIT • FLEXIBLE STEEL CONDUIT

What type of power cable

Unshielded? Metallic Shielded?

PS Shielding used directly over the conductor and also around the insulation.



(Top) PS Shielding used in conjunction with metallic tape shielding for higher conductivity and sure protection.

Three conductor cables with PS Shielding around each conductor. Ground wires in the valleys for added conductivity and strength. PS Shielding tapes coated with aluminum are used to identify a conducting tape.

Forms of PS Shielding

1. A thin coating or "skin" of conducting rubber.
2. A substantial sheath combining conductivity and mechanical protection.
3. A fibrous tape coated with conducting rubber
4. A conducting paint or cement.

Who developed PS Shielding?

Research engineers at American Steel & Wire Company pioneered in this field many years ago. Since then, numerous other companies have been licensed to use conducting rubber tapes in electrical cable construction.

shall I use—

Non-Metallic PS Shielding?

● This subject has frequently come up for deliberation among outstanding power transmission engineers. They have thrown considerable light on the question and any buyer of cable will want to weigh the advantages and disadvantages of each type.

Unshielded insulated cable can generally be used up to 5000 volts without much trouble from corona and ozone formation.

Metallic Shielding in the form of metal tapes, wire braids and wire servings has been used with success under favorable conditions for cables 5000 volts and up. However, lack of flexibility may cause serious trouble. With expansion and contraction, bending and straightening, the metal shield tends to separate slightly from the insulation forming air gaps. Each air gap is a potential danger point causing spark discharges with corona and ozone formation—highly deteriorating to an organic insulating material.

Non-metallic PS Shielding with conducting tapes for cables 5000 volts and up, eliminates many of the weaknesses of metallic shielding. PS Shielding consists of a fibrous tape coated with a conducting rubber. It stays flexible—remains in intimate contact with the conductor or insulation. No air gaps can form and destructive sparkling is prevented. Corona is definitely eliminated—and so is ozone.

Type PS Shielding may be used alone, in combination with ground wires, or as a supplement to metallic shielding. We are now able to offer a conducting rubber compound that will provide improved shielding for any type of high-voltage cable.

Write for our booklet, "Type PS Semi-Conducting Shielding" which gives complete information.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO

COLUMBIA STEEL COMPANY, SAN FRANCISCO

TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS

UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

American Electrical Wire and Cable

UNITED STATES STEEL

USERS SAY G.E.'S 9574 ALL-PURPOSE* INSULATING VARNISH "is tops!"

J. L. Hughes

How do users like General Electric's new all-purpose insulating varnish G-E 9574?

Here's a statement from J. L. Hughes, owner of the J. L. Hughes Electric Company, Columbus, Ohio.

> *"We have found from test and practical experience that General Electric general-purpose varnish 9574 is tops for our work."*

Mr. Hughes knows what he is talking about. He has been in the business of motor repair and rewinding in Columbus for thirty-three years.

YES, G-E 9574 OFFERS YOU

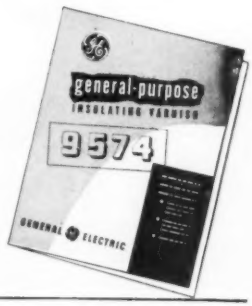
One varnish you can depend on for ALL* jobs.

A Combination of electrical, chemical and mechanical properties formerly found only in special-purpose varnishes.

Easier Handling: Low baking temperature; deep penetration; simple thinning with petroleum spirits.

**G-E 9574 gives excellent results on all types of coils except extra-high-speed armatures. It is one of G. E.'s complete line of electrical insulating materials, including adhesives, wedges, cements, compounds, cords and twines, sleeving, wire enamels, mica, papers and fibers, permafils, tapes, tubing, varnished cloths, and varnishes.*

SEND FOR BULLETIN! If you haven't yet tried G-E 9574, get in touch with your local G-E Distributor, or write for our new bulletin to Section K1, Chemical Department, General Electric Company, Pittsfield, Massachusetts.



You can put your confidence in

GENERAL ELECTRIC

CD50-K1

YOU, TOO, CAN GET...

Maximum Output from Portable Electrical Equipment

...If You Look To Input First!

Without a steady input of power, even the best electric machines, tools, and appliances fall short of top performance. And without portable cords and cables that will stand up under every operating condition you can't get steady input.

To meet the need for long, trouble-free service on all operations, Simplex-TIREX Cords and Cables are carefully designed with an eye to flexibility, electrical stability, and safe operation, and to assure toughness are jacketed exclusively with Selenium Neoprene Armor. Here's a compound that has proved itself under the most severe conditions of mining, construction, shipbuilding, and shop work to be unexcelled for balanced resistance to oils, grease, acids, moisture, flame and sunlight. It is CURED-IN-LEAD to gain extra toughness and assures effective resistance to abrasion, crushing, and twisting. When your portable apparatus is TIREX-equipped, Selenium Neoprene Armor provides security against untimely breakdowns and low output.

TIREX Cords and Cables are made in sizes and types to meet all specifications. For complete information and help in selecting those best suited to your needs, specify your choice of TIREX catalogs on the coupon below and return it today.

SIMPLEX

WIRE AND CABLE CO.

79 Sidney St., Cambridge 39, Mass.

SIMPLEX WIRE & CABLE CO.
79 SIDNEY ST., CAMBRIDGE 39, MASS.

GENTLEMEN: PLEASE SEND THE CATALOG(S) MARKED

☐ TIREX CORDS ☐ TIREX 600 V. CABLES ☐ TIREX HI-VOLTAGE CABLES

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ STATE _____

STOP POWER WASTE

ALLIS-CHALMERS Dry-Type Transformers

OPERATE MOTORS and other equipment at *full* voltage — obtain top efficiency and more production from every dollar you spend for electrical power.

Allis-Chalmers dry-type transformers spotted near power loads will reduce line losses, provide full voltage, give you these benefits:

1) FULL MOTOR EFFICIENCY — the result of operating at rated voltage. At below-normal voltages, motor output decreases approximately as the square of the voltage drop.

2) BRIGHT, FLICKER-FREE LIGHTS — by installing transformers close to the light load, you avoid flickering lights and illumination losses — a 10% decrease in voltage means a 30% loss in illumination.

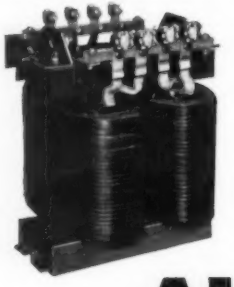
3) QUICK HEATING — by operating at full voltage, faster heating of thermal equipment is obtained — a 10% reduction in voltage produces a 19% loss in heating operation.

* * *

Easy-to-mount transformers can be located on walls, platforms, posts or directly on machines. No fireproof vaults needed. "Fibreglas" and other high quality (80° C. Rise) insulating materials permit reduction in conductor size.

When dry-types are installed, the system remains flexible . . . can be shifted when new load centers develop.

Spot your dry-types on the machine it serves and get increased efficiency by operating at full voltage.



BUILT FOR *LONG* SERVICE

FAST COOLING

Draft action draws air up through base openings and windings and out through cover overhang. Coils impregnated to make impervious to moisture and protect against dirt.

FIRMLY CLAMPED STRUCTURE

Fabricated clamping members preserve the alignment and rigidity of core and coil structure under all conditions of operation. Notched plates engaged end rails to guide transformer assembly into case. Case is Spra-Bonderized, triple-coated with baked on paint.

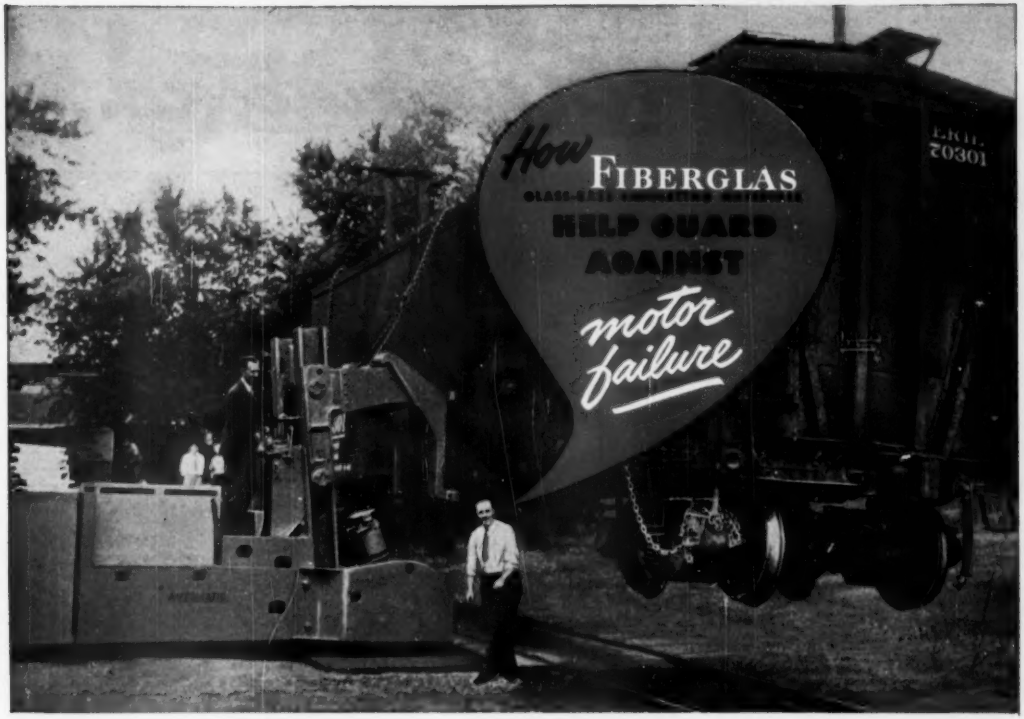
EASY CONNECTING

Clamp type connectors are standard on 15 through 50 KVA, single phase, and 37½ through 100 KVA, three phase. On larger sizes, flat drilled bars are arranged vertically for any connector.

Transformers are stocked country-wide in popular ratings. For information call your nearby A-C Sales Office. A-3165

ALLIS-CHALMERS, 930A SO. 70 ST. MILWAUKEE, WIS.

ALLIS-CHALMERS



FIBERGLAS *Yarns* HELP CUT WEIGHT, ADD POWER, AND LENGTHEN LIFE OF MOTORS

Motors that furnish power for the world's largest lift trucks must deliver peak power when it's needed—*without failure!*

But constant starting, stopping, reversing, and overloading often lead to overheating, with resultant burned out insulation and motor failure.

That's why the armatures and field coils used in the motors for these powerful hydraulic lifts are insulated with Fiberglas yarns, impregnated with silicone varnish. Because Fiberglas yarn has strength with small diameter, insulation materials made with it help motor makers reduce weight and size of such powerful motors . . . *but still retain a safety factor in excess of that obtained from other insulations.*

If you want to guard against insulation failure and "down time" in your electrical equipment, specify Fiberglas glass-base insulating materials.

*Fiberglas is the trade-mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation for a variety of products made of or with glass fibers.

OWENS-CORNING FIBERGLAS *Yarns*

OWENS-CORNING FIBERGLAS CORPORATION, Dept. 856, 16 East 56th St., New York 22, N. Y.

Announcing...

Rome RoFlex is Underwriters' Laboratories approved for 600 volts. Available in 2 and 3 conductor sizes, with or without ground wire. Packaged for convenience of handling in individual cartons. Order it from your electrical wholesaler *today*.

Rome RoFlex NON-METALLIC SHEATHED CABLE

With New GRAY FINISH

SURFACE MARKED FOR EASY IDENTIFICATION

Here is the answer to an electrican's prayer . . . a non-metallic sheathed cable with a finish that is smooth for easy pulling, clean to handle, non-flaking and clearly printed with size and name for easy identification. Yes, Rome's new gray finish is an improvement you *cannot afford to pass up.* There is no need to wear safety goggles when you work overhead with the new RoFlex. Its finish will not flake or dust off . . . does not get tacky . . . leaves you with clean hands.

Under the new gray finish, Rome RoFlex has the same high quality construction as before. It is easy to strip, smaller in diameter and light in weight. Its outer braid is a combination of glass and presaturated yarn for high resistance to mold and rot.

On your next "flex" job save time and money by insisting upon the new Rome RoFlex with the *gray finish.*

IT COSTS LESS TO BUY THE BEST

ELECTRICAL WHOLESALERS:

These Rome Cable Products Mean *Extra* Business for You

Special Wholesalers Packaged Weatherproof Wire

Here is a special 500' carton package of Weatherproof for handy contractor use. If you are not pushing this item, you are missing a fast seller. Originated by Rome for small outdoor jobs, this convenient package eliminates wastes and cuts costs. Available in sizes 4 to 14 AWG, soft and medium hard.

RoMarine-RoPrene—Type USE, Style RR

This economical and all-resistant power cable can be a sales leader. Neoprene sheathed, it resists acids, oils, moisture and flame. Ideal for industrials, utilities, residential and farm jobs, airport lighting and outdoor theaters. Underwriters' approved as Type USE for underground services.

Why it Pays to Sell Rome Cable Products

Rome Cable recognizes the electrical wholesaler as the logical distributor of its products and has always maintained a strict wholesaler policy.

Rome Cable advertises aggressively on a national scale. Its products are well known.

Rome Cable service is dependable with well stocked warehouses strategically located.

ROME CABLE Corporation
ROME · NEW YORK
From Bar to Finished Wire

ROME CABLE ROME, N.Y.

You can't buy Better Fittings or ones that cost less to use

Cross Section Showing Indentations.

Quicker to use and neater in appearance, Briegel All-Steel Indenter Fittings not only make stronger connections but also make each job more profitable to the contractor and satisfactory to his customers.

Two Easy Squeezes and they're set to stay. It is only natural that the Briegel All-Steel Indenter Fittings are the most widely used E.M.T. connectors and couplings. Contractors the world over recognize their cost cutting qualities and the fact that they make each wiring job neater, stronger and better.

All B-M Fittings Carry the Underwriters Seal of Approval

BRIEGEL METHOD TOOL CO.

GALVA, • ILLINOIS

DISTRIBUTED BY

The M. B. Austin Co., Northbrook, Ill.; Clayton Mark & Co., Evanston, Ill.; Clifton Conduit Co., Jersey City, N. J.; General Electric Co., Bridgeport, Conn.; The Steelduct Co., Youngstown, Ohio; Enameled Metals, Pittsburgh, Penn.; Kondu Mfg. Co., Ltd., Preston, Ont.

for the Electrical Industry

not one

not two ...but all three

Dutch Brand Electrical Tapes

FRICTION...PLASTIX...RUBBER

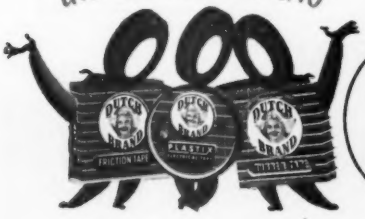
The "DUTCH BRAND" trio of electrical tapes gives you an opportunity to select the specific tapes or tape best suited to meet the requirements of your work on a performance and cost basis. No one tape will do all jobs . . . it may take one . . . or a combination of two electrical tapes.

The "DUTCH BRAND" trio gives you that selection for most efficient workmanship.

Become acquainted with all three types of tape, then select the tape most suited to your needs the next time you order.

They are available at your jobbers.

the "Dutch Brand" trio



Available in practical sizes and packaging for contractors and industrial users.

DUTCH BRAND

VAN CLEEF BROS. INC.

Manufacturers . . . Rubber Products . . . Est. 1910

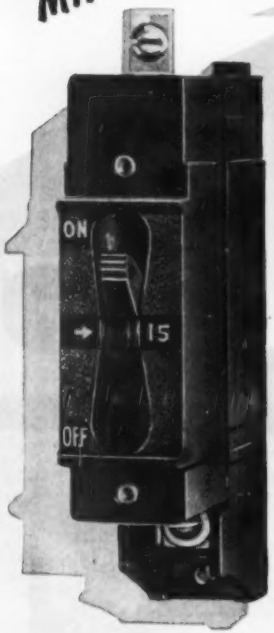
CHICAGO 19, U. S. A.

Assure Your Customer Complete Circuit Protection

HEINEMANN MAGNETIC CIRCUIT BREAKERS

ENTIRELY MAGNETIC, INTERRUPTING ACTION CAUSED BY THE CURRENT ITSELF. NOTHING HEATS.

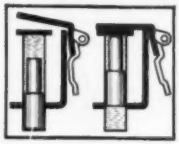
Carries full rated capacity. No "de-rating factor" needed.



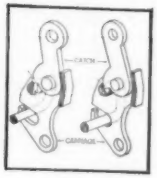
The HEINEMANN *Magnetic* Circuit Breaker is really an automatic switch that shuts off the current if it rises above a predetermined level, thus preventing damage to electrical apparatus and wiring. But since a larger amount of current is needed at first to start an appliance, the breaker will allow such current to pass for a brief time. These breakers can be mounted in panel boards to cover a number of individual circuits.

Three Important Features

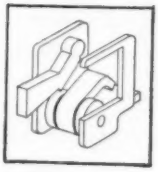
TIME DELAY: The time delay unit, which prevents unnecessary tripping on slight "starting" current, is an iron plunger hermetically sealed in a liquid-filled cylinder surrounded by a coil of wire through which the current passes. Normal current causes no action, but excess current lifts the plunger to the top of the cylinder (the liquid controlling its speed) and attracts the armature which operates the latch.



HIGH SPEED LATCH: The contacts of the HEINEMANN Breaker, under heavy spring pressure, are released by this high speed latch which, of all known latches, operates with the least amount of friction. The latch collapses only under overload or short circuit conditions, but it does so even if the handle is held in the "ON" position."



HIGH SPEED BLOWOUT: When a circuit is opened, an arc is formed at the contact points. This must be quenched. The most reliable method, that of a magnetic blowout, is used in the HEINEMANN Breaker. On a short circuit, the current flowing through the U-shaped stationary contact creates magnetic lines which force the arc into the arcing chamber and blow it out. The stronger the current, the greater the quenching effect.



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EST. HECO 1888

HEINEMANN ELECTRIC COMPANY

132 PLUM STREET **TRENTON, NEW JERSEY**

with IBM Electronic Time Control

Since the turn of the century IBM Time Systems have been providing uniform time control in offices, plants, and buildings throughout the country . . . a continuous record of accurate, reliable service.

Today, a new IBM Time System—unique in its employment of electronics—is in wide use. Connected to the regular AC lighting circuit of the building, this time system keeps every clock, time recorder, and signal on uniform time *without special clock or signal wiring.* Installation and maintenance costs are reduced to a minimum. Any time indicating, recording, or signaling unit can be re-located easily and inexpensively.

Like all IBM products, the new Electronic Time System is the result of extensive research and engineering development. The use of hundreds of thousands of IBM time units attests to their accurate, trouble-free performance, their complete dependability.

All recording, signaling, or indicating units manufactured by IBM may be installed individually or as a complete system

INTERNATIONAL BUSINESS MACHINES CORPORATION

IBM Corporation, Dept. EC
590 Madison Avenue
New York 22, N. Y.

Please send me information on IBM's Time Equipment.

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Company_____

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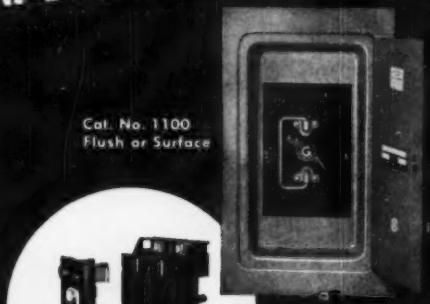
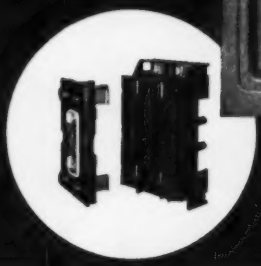
The latest addition to General's complete line of Pullout Switches

100 AMP. PULLOUT SWITCH
—Dead-Front Construction—

Cat. No. 1100
Flush or Surface





General's 100 Amp. fusible pullout switch is modern in design, attractive in appearance and sturdily constructed of top-quality materials for long dependable service—ideal as an over-all main disconnect switch.

The head and base are integrally constructed of bakelite with heavy wall sections to withstand repeated stresses without cracking. The pullout head fits neatly into the base, making positive electrical contact with a minimum of effort. ON and OFF markings permit foolproof identification of switch position.

Available in flush or surface mounting. The surface type is fitted with single fastening screw and sealable spring latch. Adequate knockouts, abundant wiring room—finished in durable gray baked enamel and packaged one to a carton.

Dead-front construction for greater safety and costs no more than externally operated switches.

Ask your wholesaler for General Cat. No. 1100 and look it over—learn for yourself why "*The switch is to* General."

Cat. No. 1163-16
1166-16

The 100 Amp. over-all main disconnect switch will also be available in combination with 12 or 16 single plug fused branch circuits and two pullout branch switches (30 or 60 Amp.) for Range and Clothes Dryer, Water Heater or similar applications.

Ask your wholesaler or write today for your copy of Catalog Supplement 911 and Price List C 5009.

General Switch Corp.

49 Roebling Street Brooklyn 11, N. Y.

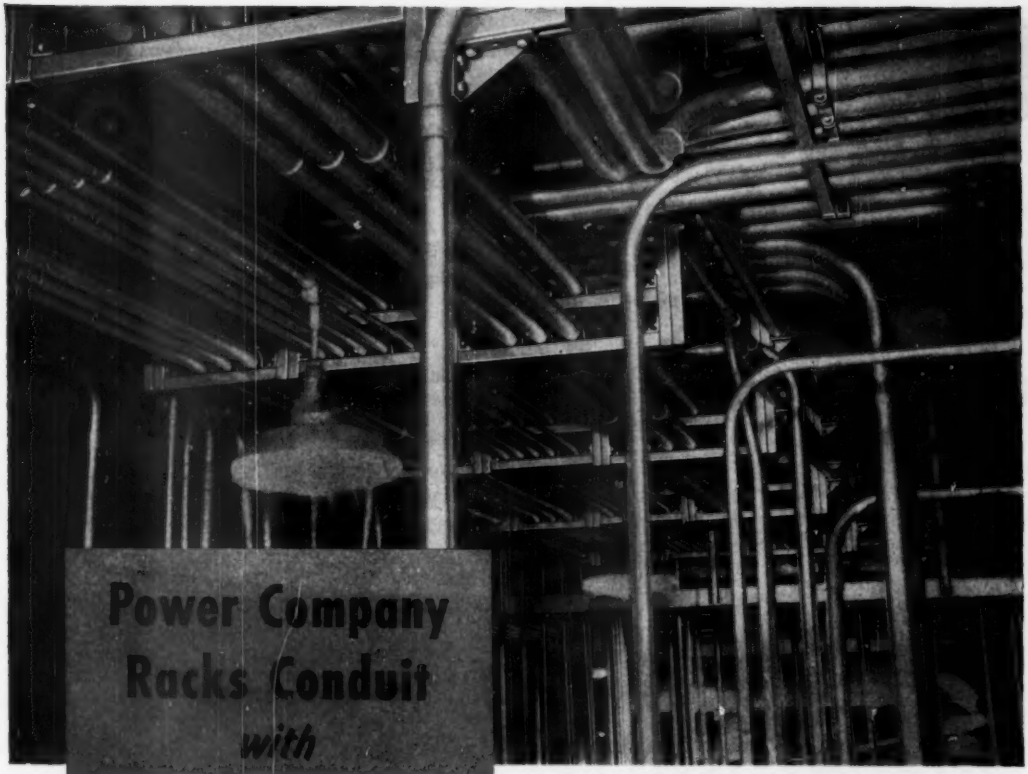
One of the leading Manufacturers of:

SERVICE EQUIPMENT . . .
Pullout, Front Operated Toggle and Side Operated types. Indoor—surface or flush, and Outdoor.

ENCLOSED SAFETY SWITCHES . . .
30 through 1200 Amp., 250 V and 600 V Type A, C and D. Indoor and outdoor. HP rated.

BRANCH—CIRCUIT PANELS

SALES OFFICES IN EVERY MAJOR CITY



Power Company Racks Conduit with UNISTRUT!

Above picture shows an exceptionally compact and well designed installation in the Dan River Steam Plant of the Duke Power Company.

Here's a good example of how one power company used adjustable, easily erected Unistrut all-purpose metal framing to support heavy rows of conduit. In this installation the company's own personnel utilized completely Unistrut's built-in flexibility, great strength and trim framework to erect foolproof "on-the-job" framing *where supporting members were added as the work progressed.*

Unistrut permitted the conduit runs to be installed closer together, conserved space, provided neat appearance and structural excellence—eliminated entirely the need for drilling, welding, or special tools. These are important cost-saving reasons why it will pay you to give Unistrut a trial in your business.

Unistrut is metal channel with a continuous slot along one side. You simply insert the Unistrut spring nut into the slot at approximate point where attachment of another framing member is desired, slide to exact location and bolt to Unistrut fitting. Nut is thus secured to inturned edges of slot—provides positive clamping action, prevents slippage. Unistrut includes concrete inserts, roller pipe supports, brackets, clamps, hangers and framing fittings, and many other standard parts which combine to provide the world's most flexible system of support or suspension.

Free Catalog! Write today for 24-page Catalog 500—Construction Uses of Unistrut in the Electrical and Mechanical Trades, and Free Sample of Unistrut.

The **3** *Quick Unistrut Steps*

Insert nut into slotted channel | Locate fitting and nut | Tighten bolt — it's done

U. S. Pat. Nos. 2327587 2363382 2329815 2380379 2345650 2405631 Other Pats. Pend.

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The World's Most Flexible All-Purpose Metal Framing

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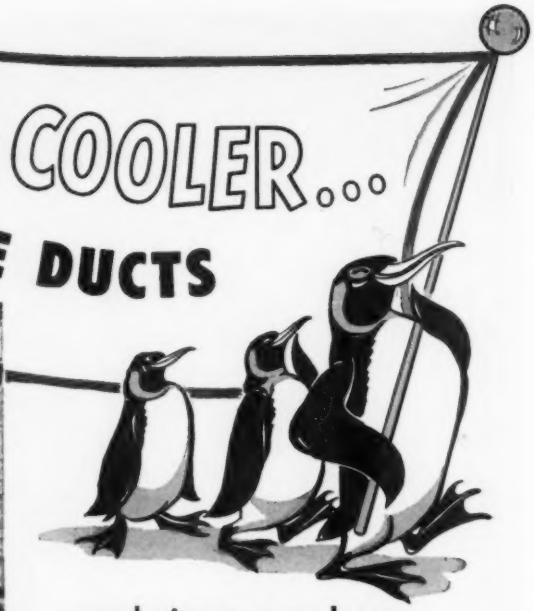
Cables run COOLER...
in TRANSITE DUCTS



. . . reducing copper losses
. . . increasing current capacity
. . . prolonging insulation life

YOU REDUCE copper losses . . . increase current carrying capacity . . . and prolong insulation life, when you run your cables in Transite* Ducts.

Current carrying capacities can be increased in a typical duct bank as much as 5%, or I^2R losses can be reduced 11%, for cables located in Transite as compared with other ducts used for power circuits.

And, Transite Ducts assure permanent duct banks because Transite is incombustible; is immune to rust and rot; is unaffected by electrolysis; will not slag under action of an arc, and will retain its high original strength.

An unusually smooth bore assures no injury to cable sheath, either in natural movement under load, or when pulling-in cables. Long, lightweight lengths can be quickly and economically installed. In addition, a full line of fittings simplifies even the most complicated of installations.

For full information on Transite Ducts, write for Data Book DS-410. Johns-Manville, Box 290, New York 16, N. Y.

*Reg. U. S. Pat. Off.

How Transite Ducts increase current carrying capacities

Type cable 3 cdr. 500 MCM Compack Sector, 15 KV
(6th Edition AEIC Spec.)
No. of cables—3 (all loaded in one bank)
Daily Load Factor—75%
Earth Temp. ambient—20 C

	Transite	Other
Total Therm. Res. to Dielectric Loss (C watts/ft.)	5.66	6.17
Total Therm. Res. to Copper Loss (C watts/ft.)	4.44	4.95
Temp. Rise from Dielectric loss (C)	1.9	2.1
Allowable Rise for Copper loss (C)	59.1	58.9
Allowable Watts per ft. cable	4.44	3.96
Allowable Current—(Amps. per cdr.)	386.	365.
Allowable Current—(Relative %)	105.6	1.00.

Johns-Manville *Transite Ducts*

TRANSITE KORDUCT—for installation in concrete

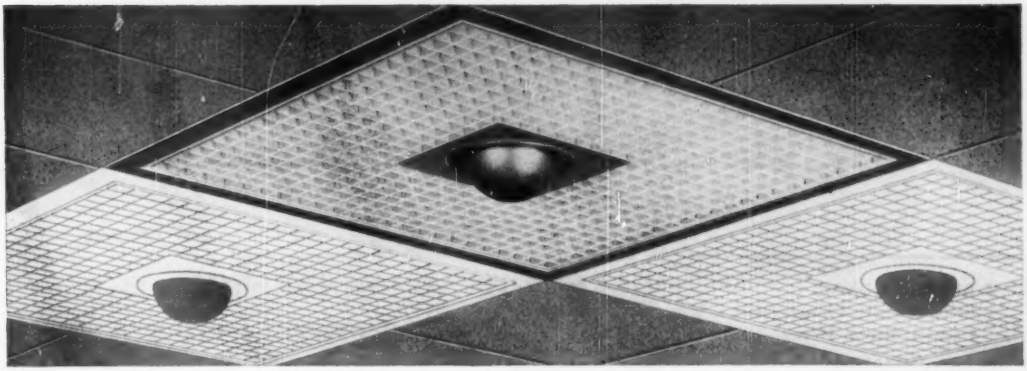
TRANSITE CONDUIT—for exposed work and installation underground without a concrete encasement

Orders for Skylike® are piling sky-high!

Silvray SKYLIKE lighting* – introduced only a couple of months ago – has excited everyone in the business: user, architect, contractor, lighting engineer. Orders and inquiries are coming in at a rate that has us jumping.

It's just our luck that STEEL has become as *hard to buy* as SKYLIKE is *easy to sell.* The Silvray Lighting purchasing department just can't find steel fast enough right now to catch up with the overnight-sensation popularity of this brilliant new concept of commercial lighting. You know the worthwhile reason, of course, so there's nothing to do but realize that Silvray SKYLIKE units will be produced – and orders will be filled – just as fast as conditions permit.

Meanwhile, for your future planning, we'll gladly send you a copy of the brochure, "Skylike Louvered Incandescent Lighting Systems". Write to *Room 1502, Graybar Electric Company, Inc., 420 Lexington Avenue, New York 17, N. Y.* *Patent pending



Why so many businesses want Skylike

The SKYLIKE system combines the best features of silvered-bowl incandescent lighting with the architectural appeal of a fluorescent-type troffer. No other type of lighting has all its advantages! Here are some quick facts:

- Warm color—most desired by merchandising experts.
- High initial and maintained light output.
- Softly diffused shadows.
- Low brightness and 90° shielding.
- No flickering, blinking, or hum.
- Instant starting.
- Variable lamp size—150- to 500-watt.
- No light loss from darkened walls or ceilings.
- Floor-service relamping—no ladders or scaffolds.
- Hermetically sealed silver reflecting surface.
- Units fit 24" x 24" ceiling tiles, fully or partly recessed, or surface-mounted, in rows or patterns.
- Easily converted, with simple accessory, for directional or accent lighting.
- Simple in construction; simple in wiring; free of ballasts, starters, transformers.
- Lightweight; low-cost supporting construction.
- 87% reflection factor, easily maintained by occasional wiping with a damp cloth.
- Low-cost! ½ to ⅓ the cost of equipment delivering comparable results.

SILVRAY

Skylike

Distributed by GraybaR ELECTRIC COMPANY

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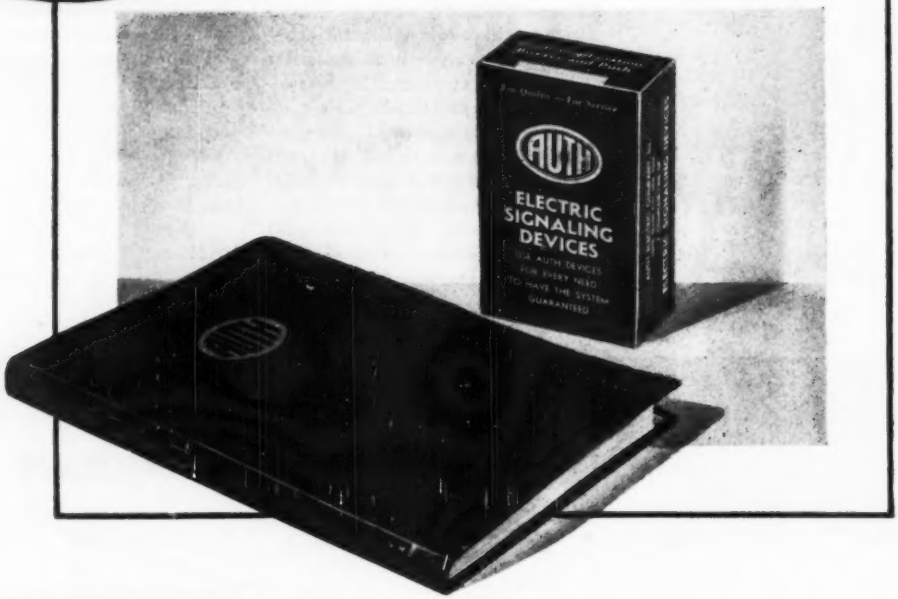
One Complete Source



- **AUDIBLE SIGNALS**
  Bells, Buzzers, Chimes (Non-Electric), **Sirens, Horns**
- **ANNUNCIATORS**
- **PUSH BUTTONS**
- **TRANSFORMERS**
- **BURGLAR ALARM DEVICES**
- **FIRE ALARM SYSTEMS**
- **INTERCOM TELEPHONES**
- **APARTMENT MAIL BOXES; TELEPHONE, BELL SYSTEMS**
- **CLOCK & PROGRAM SYSTEMS**
- **HOSPITAL SIGNALING SYSTEMS**

ELECTRICAL SIGNALING, PROTECTION AND COMMUNICATION EQUIPMENT

Auth's *complete* line eliminates the necessity for going to several sources for similar stocks — and Auth's reputation for competitive prices and quality merchandise protects you in the use of *one single source of supply!*

Inspect an Auth Catalog! Compare Auth products with any others! Investigate Auth's reputation for integrity, quality and service! You'll be glad to *depend* on Auth.

MANUFACTURERS OF

Electrical Signaling, Communication and Protective Equipment for Housing, Hospitals, Schools, Offices, Ships and Industry.

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Complete Systems • One Responsibility

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NO OTHER TESTER

does so much...so well!

WESTON
Model 785
INDUSTRIAL CIRCUIT TESTER

In the shop . . . 28 ranges *in one case* to locate circuit troubles on production equipment.
On the bench . . . 28 ranges *in one case* for checking electrical equipment during manufacture.
In the lab . . . 28 ranges *in one case* immediately available for research and development work.

28 Instrument Ranges

D-C VOLTS: 100 mv, 1/10/50/200/500/1000 volts (20,000 ohms per volt).
A-C VOLTS: 5/15/30/150/300/750 volts.
D-C CURRENT: 50 microamps; 1/10/100 milliamps; 1/10 amps.
A-C CURRENT: .5/1/5/10 amps.
RESISTANCE: 3000/30,000/300,000 ohms; 3/30 megohms.

Stock Accessories Available for Extending Above Ranges

It does *so* much, *so* well, for *so* little. Check your Weston Representative for full details or see your local jobber. Weston Electrical Instrument Corporation, 672 Frelinghuysen Avenue, Newark 5, New Jersey . . . manufacturers of Weston and Tagliabue Instruments.

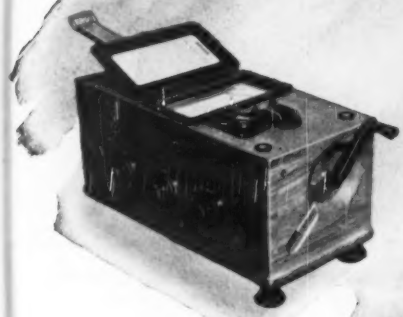
WESTON *Instruments*

Albany • Atlanta • Boston • Buffalo • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Houston • Jacksonville • Knoxville • Little Rock • Los Angeles • Meriden • Minneapolis • Newark • New Orleans New York • Orlando • Philadelphia • Phoenix • Pittsburgh • Rochester • San Francisco • Seattle • St. Louis • Syracuse • Tulsa • Washington, D. C. • In Canada, Northern Electric Company, Ltd., Powerlite Devices, Ltd.

knowledge plus experience

. . . these have given him the surest instrument

. . . faith in himself



The BIDDLE business was and is being built on the faith of its customers in our ability to supply high quality instruments and personal service.

BIDDLE instruments enjoy the wide acceptance they do, because they have been dependable through long periods of service . . . They have been their own best salesmen. BIDDLE service files bear mute testimony to instrument after instrument that has served generations of workers . . . has amortized its purchase price long ago . . . and upheld the judgment of its original purchaser. Price tags and "specs" can't possibly reflect the quality or performance of a fine instrument or the integrity of its maker . . .

JAMES G. BIDDLE CO.
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Electrical Testing, Speed Measuring Instruments, Laboratory and Scientific Equipment — Established Since 1895

MEGGER® INSULATION AND RESISTANCE TESTERS • MEGGER GROUND RESISTANCE TESTERS • FRAHM® RESONANT REED TACHOMETERS • FRAHM RESONANT REED FREQUENCY METERS • JAGABI® TACHOMETERS AND SPEED INDICATORS • JAGABI LUBRI-TACT® RHEOSTATS

NOVEMBER . . . . *at a Glance*

NECA

When Ed Vanderlinde swung the presidential gavel at Los Angeles last month to open the annual convention ot the National Electrical Contractors Association, almost a thousand members and guests responded. A well organized program got under way. Beginning on page 45, Associate Editor Alice McMullen summarizes the convention proceedings and discussions. Midwest Editor Gus Eckel rounds up in pictures well known industry personalities from near and far.

Selling Aids

Armed with case studies of successful selling experiences and a long background of sales experience and training men to sell, Francis Sullivan will be turning out more stories for us like "Sell Four Words" on page 56. Like his "Gold Plated Selling," which appeared in August, his story this month is based upon an actual case with the people and situations modified only enough to bring basic sales tactics into sharp focus. Under the sugar coating of easy narrative is a case of sound selling counsel.

Reader Service

Questions addressed to the editor sent by way of the Reader Service card on page 129 have arrived in great numbers. The type of questions and their variety swamped our facilities to the point where we were running behind. Methods of improving the service and speeding it up are being applied. This month we believe we are on a current basis and replies should be reaching you promptly. If you have previously sent in a question and have not had a reply, please repeat your question, and be sure your name and address are printed or clearly legible.

1300 Disposers to Wire

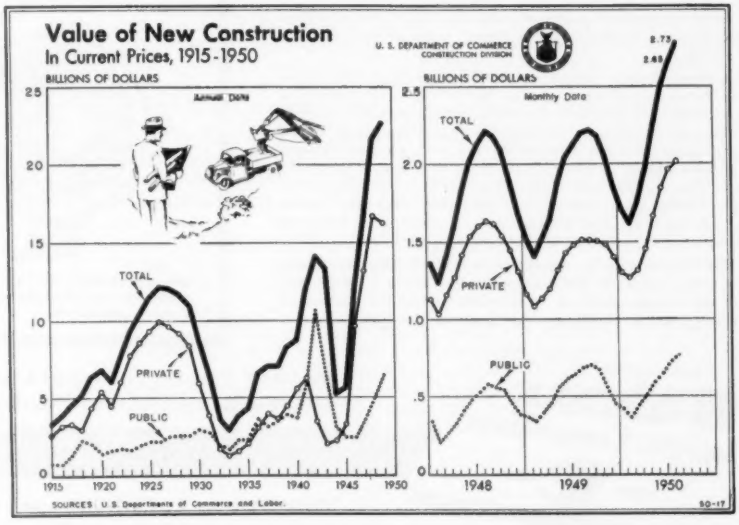
In Jasper, Indiana, you have to dispose of garbage electrically. It's the law. The public health and social implication of this 100 percent conversion to garbage disposal through the town's sewage system by means of electric waste disposers are great indeed, but to the electrical folks in the area, the project presented many unprecedented problems. Gus Eckel's story tells how wiring and installation problems were met on page 58.

Production Wiring

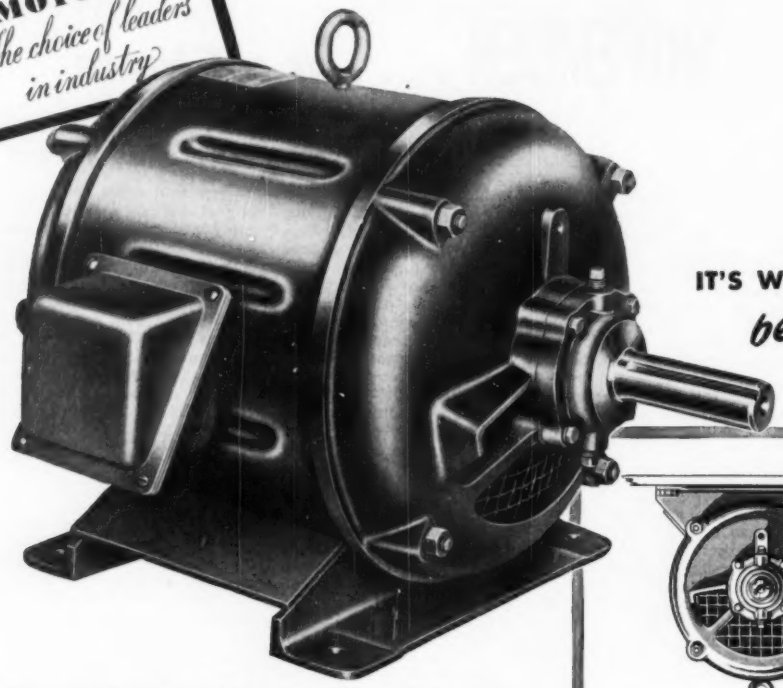
Once in a while, we run across a project that has presented the electrical contractor with the opportunity to use mass production methods. Sometimes we find exceptionally well planned use of modern tools and power driven equipment. A huge Los Angeles housing project, however, combines both. California Electric Construction Company did the job, John J. Howard, vice president and general manager tells us how in "Mass Production Wiring Methods" on page 52.

Lighting Accents

The suburban store, once just a convenient supplement to the downtown emporiums, is taking on an ever larger role in merchandising. Modern selling methods, attractive surroundings and planned lighting have broadened its influence. Today the suburban store represents one of the prime markets for modern lighting application. Typical of such projects is the department store described in B. C. Cooper's "Lighting Accents Suburban Store" on page 62.



WAGNER MOTORS
...The choice of leaders in industry



IT'S WAGNER *because:*

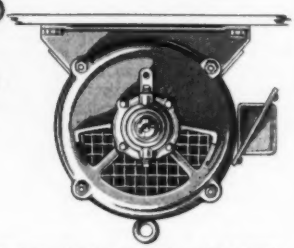


Diagram showing endplates rotated 180° for drip-proof installation on ceiling.

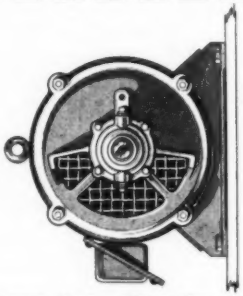


Diagram showing 90° rotation of endplates for drip-proof horizontal mounted sidewall installation.

Wagner Steel-Frame Motors proved by years of service!

Wagner steel-frame drip-proof polyphase motors have been proved—durable, dependable, and trouble-free—by twenty years of hard usage in industry after industry.

These open-type squirrel-cage motors are available through 326 frame size, with either sleeve or ball bearings. The motor frames are formed of heavy rolled steel, shaped to accurately center the stator core and to provide passages for adequate ventilation. A large auxiliary fan draws in air through the openings in the front endplate, forces it through these passages and out through the endplate openings on the drive end. Heat is effectively carried off from all parts of the motor. Because of the fact that there are no openings in the frame, these motors are completely drip-proof when mounted in the normal horizontal position, and by rotating the endplates are still drip-proof in the sidewall or ceiling horizontal positions.

Bulletins give full information on the complete line of Wagner Motors. Thirty-one branches, located in principal cities, are ready to assist you whenever you have a motor problem. In addition, almost 500 authorized motor repair shops provide speedy, nationwide service facilities.

Wagner Electric Corporation
EST. 1891

WAGNER ELECTRIC CORPORATION
6413 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS - TRANSFORMERS - INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS - AIR AND HYDRAULIC

BRANCHES IN 31 PRINCIPAL CITIES

ELECTRICAL CONSTRUCTION AND MAINTENANCE

50th Year — NOVEMBER • 1950

Controls

CONTROLS AFFECTING CONSTRUCTION are taking shape. More stringent credit requirements for housing is expected to cut that market about a third, though some builders fear the cut will be very much greater.

INVENTORY CONTROL and a proposed order banning certain types of projects, notably race tracks and night clubs, do not seem to portend drastic curbs in present form. However, D. O. orders giving military requirements first call will skim off a considerable amount of scarce material, aggravating the commercial struggle for what is left.

STOCKPILING of critical materials for strategic military purposes plus buying for present or expected requirements by industry has placed an enormous demand on available supplies. The resulting shortage, however, is causing sharp increases in production of practically everything.

WHEN CONTROLS AND ALLOCATIONS begin to distribute requirements, we may find that the resources to be shared have increased substantially. And it is this dynamic characteristic of our economy that should be carefully watched and nurtured as further controls become necessary.

IN THE EARLY DAYS of the last war, it was assumed that the war program would absorb so much of our economy that living standards would reach a new low. The fallacy of such reasoning was in its ignoring our capacity for accelerating production. There is reason to believe that some of the dire warnings of today may be equally wrong.

THE IMPACT OF MILITARY ORDERS are still to come. It will be months before the economy will feel its full weight. Many of the present dislocations may be transitory and it is entirely possible that we may still support a vigorous civilian economy parallel to mobilization requirements.

IN ELECTRICAL WORK, the total requirements in strategic materials are not great. The benefits of modern wiring to industry and commerce on the other hand are vitally important.

UNDER WHATEVER SYSTEM of controls that may evolve, the essential uses of electrical materials and apparatus are a functional part of the process of expanding production and supporting civilian needs. The course of our future economy may hinge on the effectiveness and the efficiency with which the electrical industry can meet the challenge of the months ahead.

William T. Stuart

IT'S ALWAYS RIGHT

and right on schedule

. . . with wiring materials via Graybar

You're sure *every* item on your wiring materials and supply order will be right for the job—and if you schedule ahead with Graybar, you'll stand the best possible chance of having everything arrive on the job site when it's needed. You know all the items will fit together properly. Because you can depend upon Graybar delivery commitments, there'll be no waiting for conduit to come from one supplier . . . boxes and fittings from another . . . wire from a third. And your order gets an important "plus" of personal interest, for Graybar is wholly owned by its operating and retired personnel. From the man who takes your order to the one who packs it, we're anxious to serve you well.

EXPERT HELP WHEN YOU NEED IT

To help you or your customers in planning complicated systems or solving difficult wiring problems, a Graybar Inside Construction Specialist is available. His recommendations, supplementing the knowledge of your local Graybar Representative about materials and delivery, will help keep your wiring jobs moving "right on schedule".

One order for everything

With a single order to Graybar, you can obtain everything for any wiring job . . . big or small . . . indoors or out. Graybar distributes 100,000 electrical products of more than 200 manufacturers—carefully selected materials, supplies, equipment, and tools for wiring, lighting, communication, power, and all your other electrical needs.

Free samples of tape

So that you can test them for yourself on your wiring jobs, we'd like to send you descriptive folders and free samples of "Scotch" Electrical Tape No. 27 and "Scotch" No. 33 Electrical Tape—plus a free sample of Sticka friction tape. To get yours, just write *Dept. 5071, Graybar Electric Company, Inc. Executive offices: Graybar Building, New York 17, N. Y.*

NECA Convention Report

Training program launched, lump sum contracts urged, and industry viewpoints presented at 49th annual meeting of NECA at Los Angeles, Calif.

John W. Jenner, Wichita, Kansas; H. L. Scott, Corpus Christi, Texas; Edw. Vanderlinde, Rochester, N. Y., and Paul M. Geary, Washington, D. C.

"PROGRESS Through Efficient Management and Training" was the theme of the 49th annual convention of the National Electrical Contractors Association held at the Biltmore Hotel, Los Angeles, Calif., October 17-20. Registration totalled over 900 delegates from Canada and Alaska, as well as from all sections of the United States.

Discussion centered around the problems concerning industrial mobilization for war, an industry-wide educational plan for management and technical personnel in contractor organizations, a business promotional program for selling electrical modernization, a legislative program advocating lump sum contracts instead of cost-plus agreements and a separate bidding procedure. Other subjects involved a rigid economy in government, private ownership of the electric power industry, a public relations program, labor relations and extension of apprenticeship and training.

President's Address

"Industry can best fight communism by expanding its services to the public", Edw. Vanderlinde, president of NECA said at the opening session. He emphasized the close dependence of all elements of the business community on the preservation of the American free enterprise system and stated "Profit being the main objective in every business venture, let's get that profit, not as a basis, but as a result of service. Let's make service a working partner, instead of a silent partner in the electrical contractor's business."

Mr. Vanderlinde cited undercost bidding as the "most disturbing and destructive element in the electrical contracting business. This vicious, foolhardy, uneconomic practice is not restricted to any single section of the country, it is found in every district, every chapter, city and hamlet.

"I am not too much concerned about the contractor who persists in these practices going broke, but I am concerned about what and whom he drags into the mire with him," he said.

"American business is based on the premise that a profit will be returned on capital invested and services rendered, and the public expects to pay that profit if honestly earned. The contractor who intentionally takes a job under cost, and then proceeds to cut corners, removes any and all public confidence in the entire construction industry.

"At the present time I can think of only one preventive," Mr. Vanderlinde said, "and I recommend it only as a last resort; that is, that business be taxed not on the basis of profits, but on the basis of gross dollar volume. In other words, a business permissive tax that doesn't differ in amount on a million dollar volume, that has earnings of $100,000, or losses in an equal amount."

Continuing he said, "Progress—our theme—is defined as a movement forward, advancing to an objective, gradual betterment, progressive development or evolution of mankind as a process. Progress involves risks; you can't steal second and keep your foot on first.

"Let's go forward—in training for better personnel; by promoting a better spirit of cooperation and good will among the membership; by greater and better cooperation with other branches of the electrical and construction industries in furthering fair and ethical business practices", Mr. Vanderlinde concluded.

At the opening session reports were given by Clint J. Harder, secretary-treasurer and Paul M. Geary, executive vice president. Mr. Harder reported that the association had shown steady progress both numerically and financially. As of September 30 the membership totaled 3,008, a net increase of 12 members. During the year six chapters had been added, making a total of 94 chapters. The anticipated income for the year from all

T. E. Ytreland, Minot, N. D., and George Deyo, Sioux City, Iowa.

J. C. Bolen, Charlotte, N. C., and R. K. Robinson, Charlotte, N. C.

S. I. Jaggar, Portland, Ore., and Ray A. Montgomery, Portland, Ore.

O. O. Eckardt, W. Reid Puckett, J. A. Peterson, Fred McLendon, and T. H. Fulton, Atlanta, Ga.

E. R. Cornish, Washington, D. C., and R. Goold, Stockton, Calif.

S. C. Dodson, Omaha, Neb.; R. C. Hughes, Spokane, Wash.; and C. H. Simpson, Cheyenne, Wyoming.

C. F. Hammer, H. C. Scannel, W. N. Brown, Robert Hammer, all of Toledo, O.; and Morris Dorn, Maumee, Ohio.

A. L. Stone, Los Angeles, Calif., and S. F. Hill, Los Angeles, Calif.

A. Herrmann Wilson, Washington, D. C., and Charles C. Emich, Baltimore, Md.

sources would be $585,170, Mr. Harder said.

Mr. Geary discussed the activities of the association during the past year, with respect to its efforts to improve the position of electrical contractors in all of their economic relations.

"The association is, from every point of view, in the strongest position in its history. It's activities are more expanded and its opportunities to benefit the industry greater. Also its responsibilities are greater," Mr. Geary said. The present reserve is estimated at $250,000. The Association employs 28 persons, 10 are field representatives.

Continuing Mr. Geary said "Electrical contracting is an industry of small business men. There are approximately 10,000 concerns who are in the business and recognized as employers by the labor organization that represents our employees. More than half employ an average of less than 5 men. Only 78 concerns employ an average of more than 100 men. The average for all concerns is about 10 men.

"The methods which any trade association must use to carry out its objectives," Mr. Geary said, "are determined by the character of the industry which it serves and the limitations of political legislation. The NECA program is (1) to influence at the national level all affecting elements of the economic system to perform in the manner which will react to the benefit of the local contractor (2) By educational methods to raise the standards of industry in personnel and performance. (3) To provide individual members on a collective basis with the same type of management service as big business concerns are able to provide for themselves individually."

Training Committee

Richard W. Osborn of St. Louis, Mo., substituting for Robt. W. McChesney of Washington, D. C., chairman of the Management and Technical Personnel Training Committee, reported on the contests that had been held during the past year.

Lyle N. Foster, Peoria, Ill.; I. H. Anderson, Danville, Ill.; Glen Durham, Springfield, Ill., and R. M. Best, Peoria, Ill.

J. W. Albright, Detroit, Mich., and Murray L. Ansel, Detroit, Michigan.

J. H. Hall, Dallas, Texas, and N. A. Cordier, Salem, N. Y.

Edward J. White, Newark, N. J.; W. B. Schnorbus, Houston, Texas; and G. C. White, Ft. Worth, Texas.

Wm. Lisch, Milwaukee, Wis.; and B. H. Barg, Milwaukee, Wis.

A. Bartlett, Sr., Providence; W. Frazer, Phila., Pa.; R. Johnson, Denver; O. Burnett, Jr., Chicago; and D. Clayton, Birmingham.

Harold W. Johnson, F. E. Keith, and Wm. F. Arnett, all of Des Moines, Iowa.

Sam C. Sachs and Louis S. Sachs, St. Louis, Mo.

Edward Bayer, Omaha, Neb.; Harold Kenworthy, Omaha, Neb.; A. C. Sykes, and Claude Howell of Omaha, Neb.

The winners in the Estimating Division were John W. Leadbetter, South Bend, Ind.; Louis W. Murry, Philadelphia, Pa.; Robert Scisco, Newark, N. J.; and J. E. Sanborn, Amarillo, Texas; with an honorable mention to Ralph Johnson, Denver Colo. In the Job Management Division, J. C. Bolen, Charlotte, N. C. and John Leadbetter, South Bend, Ind.; in Sales Engineering, Ralph Johnson, Denver, Colo., and E. J. White, Newark, N. J.; and in Accounting, Gertrude B. Dietrich, Pittsburgh, Pa., J. B. O'Neil, Oakland, Calif., James R. Gilger, El Paso, Texas and Wilbur J. Vulle, Springfield, Ill. First prize consisted of $100, second $75, third $50 and fourth $25.

E. R. Cornish, the new NECA director of research and education, presented a detailed outline of the industry training course developed by Mr. McChesney's committee.

Mr. Cornish stated that the course of study is designed for the management and technical personnel of electrical contractor organizations and is intended to help them increase their qualifications to conduct the business of electrical contracting. The need for such training was recognized last year by the industry and an industry-wide training program was authorized by NECA at the 1949 convention in Houston. A sum of $65,000 was made available to start this program.

"The most pressing problems of the electrical contractor arise from the lack of training of the persons engaged in management and in technical supervision" Mr. Cornish said. "NECA realizing the existence of this situation, has taken steps to provide the means to secure this training. A survey of courses of study in the technical schools, colleges, and universities throughout the country failed to reveal any institution with a course of study that would meet the needs of the industry, and further, these institutions cannot conduct classes in a manner which would permit students to receive instructions without having to leave home or lose time from employment.

M. S. Blumberg, Louis Freund, and Max J. Levy, all of New York City.

L. J. Fieldhack, Milwaukee, Wis., and Albie J. Buge, West Allis, Wis.

R. Bartlett, Salt Lake City; J. Gilgan, Caldwell, Idaho; A. Woolley, Pocatello, Idaho; and G. Howarth, Salt Lake City.

E. E. Lewis, Albuquerque, N. M.; R. Viener, Jr., New Orleans, La.; and Dan Duvoisin, New Orleans, La.

E. P. Dixon, Memphis, Tenn.; H. F. Roettger, Evansville, Ind., and Wm. E. Powell, Evansville, Ind.

J. S. Copeland, Houston, Texas; A. E. Bertke, Cincinnati, Ohio; O. H. Taylor, Toledo, Ohio, and Leo J. Witt, Youngstown, Ohio.

H. H. Lundberg, Chicago, Ill.; E. R. Hansen, Chicago; Fred Stocek, Chicago; and E. E. Leasure, Jr., Chicago.

"NECA is developing a training course which will provide methods of giving instruction so that any eligible person, wherever he may live, can enroll in the program without the inconvenience of living away from home. The course will be of value to the smaller contractor who may himself actually perform one or more of the functions of his business, as well as to the employee who specializes in only one function of a large contracting business."

Mr. Cornish stated that the course is divided into five major divisions, Accounting, Sales Engineering, Estimating, Job Management and Business Administration. Under each division there will be a half dozen or more study units and texts of approximately 60 pages each are being prepared for each of the study units.

Three plans of instruction proposed by the committee were outlined by Mr. Cornish. "Plan A—A NECA chapter may arrange with some local institution for instruction to a class using the NECA study units. Plan B—A NECA chapter may arrange to have some person act as supervisor of a group to receive instruction by correspondence school or other approved method. Plan C—An individual may arrange to receive direct instruction by conventional correspondence school method."

All members of NECA and their employees, who have permission of their employers, are eligible to be enrolled in these courses.

Governmental Affairs

In the absence of L. T. Souder, chairman, the report of the Governmental Affairs Committee was presented by D. B. Clayton of Birmingham, Ala. The following five recommendations were made regarding the defense program:

"1. Contracts for all construction and modernization projects be let on a lump sum basis, making exceptions only in the most unusual instances.

"2. Full use of existing specialty contractor organizations, who are ready, have the tools, equipment, engineering staffs and capability, and are eager to do the job, be made instead of letting them stand idle while inexperienced and inefficient high-cost integrated organizations are established.

"3. The job management functions and experience-tested industry practices be given full play and encouraged rather than suppressed or supplanted by arbitrary or unrealistic policies or procedures; that the electrical contractor be given complete control of estimating and purchasing of all electrical equipment and material.

"4. The specialty contracting industries be given, in any priority or allocation program, preference ratings for the job and not by individual classes of material so that all material could be scheduled properly and the project completed as a unit.

"5. Awarding authorities take such practical steps as pre-qualification of bidders and separate bidding procedure for the electrical and mechanical contracting work so as to encourage a wider participation in the competition by competent specialty electrical contractors. This would permit the awarding of the specialty electrical work to organizations of experience and proven capabilities. Such specialty electrical contracts may be included under the general contract if desired."

This proposal was in the form of a resolution recommended by the Committee and was formally adopted by the Association.

Trade Practice

The Trade Practice Committee recommended that the Association be authorized to confer with the Federal Trade Commission about bringing the industry's fair trade practice rules up to date. F. E. Keith of Des Moines, speaking for A. E. Smiley of Kansas City, chairman, pointed out that the current fair trade practice rules were adopted in 1931. He said that they are disregarded with impunity and no machinery has been set up for their enforcement and no request ever has been made to the Federal Trade Commission for its cooperation in their enforcement. He noted that some of the language is not as clear as is necessary in such a complex industry as electrical contracting.

The request for authority to confer with the Federal Trade Commission is for the purpose of determining what changes should be made in the present rules to make them conform to existing legislation, what changes the Commission might be willing to approve to make the rules more applicable, and also to apply for another Trade Practice conference if such is necessary.

Given a practical set of rules under which to conduct the business, the Committee recommended that compliance with them should be made a condition of membership in NECA.

The committee reported that there are seven principal complaints about

the ethical conduct of electrical contractors. These include "efforts to induce breach of existing contracts; pirating of labor; damaging false statements about a competitor; bidding below cost; substitution of inferior materials and methods; commercial bribery; and bid peddling."

Labor Relations

In the absence of E. C. Carlson, Youngstown, chairman of the Labor Relations Committee, E. L. Buttner, of Oakland, presented a summary of the respective bargaining positions of the IBEW and NECA in terms of strength and manpower shortage.

John S. Clark, El Paso, chairman, Line Constructors Committee, compared the handling of labor negotiations for line construction through an existing chapter and through a line chapter. He emphasized the need to represent employers of 51 percent of employees hired, else line work may go to general and other contractors whose employees may be union, but not IBEW.

Paul Geary reported for Chairman McChesney on the Council on Industrial Relations, reviewed its history and principles and urged good sportsmanship in accepting its decisions. C. W. Mosley discussed jurisdictional problems that arise as to who will handle heavy construction equipment and the setting of heavy machines. He also touched on insurance to such equipment and whether a contractor should own or rent transportation equipment.

R. C. Hughes of Spokane spoke of the opportunities for line work brought about by the Government's power program and the REA, and urged concerted action to get governmental agencies to agree to prevailing wage rates in an area in order that contractors can be competitive to use union labor in such work.

Laurence W. Davis, Washington gave a financial report on the employees benefit program. He showed that the contractors' fund exceeds the IBEW contribution by over a million dollars, which surplus may help tide over a period of slack employment and an increase in IBEW pensioners. S. J. Cristiano, New York, described procedure in handling of two types of jurisdictional disputes—Intra-IBEW and between IBEW and other building trades. He urged in all cases to use these procedures and that contractors themselves do not get into the problem at all.

Industry Viewpoints

The convention closed with a forum entitled "As Others See Us". Representatives of the electric utility industry, electrical manufacturers, general contractors and industrial plants gave their views on how well the electrical contractor is doing his job, and suggested some ideas that would contribute to progress.

"You, the members of NECA, probably have the largest amount of contact with the public of any segment of the electrical industry, and the utilities unanimously agree that you constitute the greatest untapped selling force that the electrical industry has today" said Robert E. Ginna, executive vice president of the Rochester Gas & Electric Corporation, Rochester, N. Y. "There yet remains the need for a real awakening, on the part of the rank and file of your branch of our great electrical industry, to the opportunities available to them through better salesmanship and promotion.

"The basic idea which needs to be sold now and in the future is one of mutual confidence and the conviction that the sales activities of each of us creates business for all of us", he said.

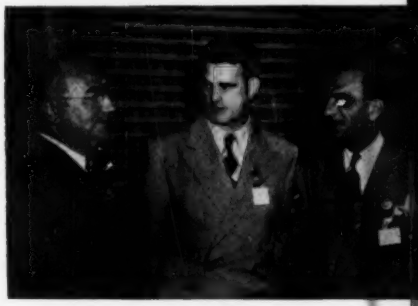
"Too many electrical contractors are doing a poor selling job because they are not sales-promotion-minded", Mr. Ginna continued. "To secure the business on the basis of a reduction in the quality of a job—selling down rather than selling up—is a fundamental mistake."

"You should promote membership in NECA, in other electrical associations and contractor-utility meetings. If there is some reason why utilities cannot be members of NECA, the conditions and circumstances should be reviewed and reconsidered," Mr. Ginna said.

E. F. Luna, sales promotion manager of the Anaconda Wire & Cable Company, commended the electrical contractors for "most encouraging progress" during the past year in their effort to develop sales consciousness effectiveness. He said that the awakening to business development by the contractors prompted his company to undertake a major promotional effort this year tailored to the contractor's use. This program is known as "Power Up and Be Prepared", and is designed to bring the benefits of proper electrical applications in industrial plants to increase production for defense and civilian needs.

(*Continued on page 204*)

Meyer Bank, New York City; William Leibfried, New York City, and L. C. MacNutt, New York City.



Harry R. Vancott, Los Angeles, Calif.; A. H. Prouty, Los Angeles, and M. N. Shansby, Los Angeles.

Roy M. Butcher, San Jose, Calif., and C. D. Bronson, Oakland, California.

R. B. Groseclose, Fairbanks, Alaska, and John Majerus, Seattle, Washington.

How to Estimate Electrical Work—10

- **Unit data for wire cable**
- **Unit data for cabinets and panels**
- **Unit data for enclosed switches**

7. WIRE AND CABLE

7a. Wire and Cable Pulled in Raceway — man hours

Branch Circuit Sizes	Per C Ft. Standard	Per C Ft. Short
14	.70	1.05
12	.75	1.10
10	.95	1.40
Feeders Sizes		
12	1.00	1.50
10	1.15	1.70
8	1.45	2.20
6	1.72	2.60
4	2.10	3.10
2	2.60	3.90
0	3.20	4.80
00	3.75	5.60
0000	4.90	7.30
300 c.m.	6.00	9.00
500 c.m.	9.00	11.00
Signal Sizes		
18	.70	1.05
16	.70	1.05
14	.80	1.20
12	1.00	1.50
Twist pair or trip	1.15	1.70
Shielded pair	1.30	2.00

NOTES: When job totals of any size exceed 500 feet use Standard.
When job totals of any size are less than 500 feet use Short.

8. SAFETY SWITCHES

8a. Enclosed Switches and Circuit Breakers — man hours

Amp.	2 Pole	3 Pole	4 Pole	
30	1.40	1.70	2.10	each
60	1.80	2.50	3.20	each
100	2.60	3.80	5.00	each
200	3.70	5.20	6.70	each
400	6.20	9.10	12.00	each
600	9.80	13.20	16.60	each

NOTES:
1. Units do not include fastening to structure. Time for setting screws, bolts, inserts or shields, according to type of supports required, must be added.
2. Units include cutting, dressing and connecting wires to solderless type lugs.

9. PANELBOARDS

9a. Cabinets — man hours

Square feet		
2	.70	each
4	1.00	each
8	1.70	each
12	2.90	each
16	3.50	each
20	4.20	each

9b. Main and Circuits — man hours

	Spare	2 wire	3 wire	4 wire	
15	.30	.92	1.27	1.62	each
30	.40	1.27	1.85	2.43	each
60	.50	1.72	2.50	3.22	each
100	.90	2.50	3.80	5.10	each
200	1.00	3.50	5.20	6.90	each
400	1.00	4.60	8.60	12.60	each

NOTES:
1. Fastenings are not included. Time for screws, inserts, etc., required must be added.
2. Units include cutting, dressing and connecting wires to solderless type lugs.
3. Units for cabinet, mains and circuits should be totaled for complete panelboard unit.

10. SERVICE ENTRANCE FITTINGS

10a. Service Heads — man hours

	E. M. T.	Rigid Conduit	
1 in.	.25	.25	each
1 1/4 in.	.28	.30	each
1 1/2 in.	.30	.35	each
2 in.	.35	.45	each
2 1/2 in.	—	.60	each
3 in.	—	.70	each

10b. Service Els — man hours

	E. M. T.	Rigid Conduit	
1 in.	.50	.50	each
1 1/4 in.	.56	.60	each
1 1/2 in.	.60	.70	each
2 in.	.70	.90	each
2 1/2 in.	—	1.20	each
3 in.	—	1.40	each

NOTE: Units do not include fastenings. Time for screws, inserts, shields, etc., must be added.

THE tables shown this month continue the unit data for estimating labor hour requirements for electrical construction work. Before using these data, the reader should refer to the preceding articles in this series.

The installation of wires and cables, for which unit data is given in table 7, can be developed to more or less elaborate detail. Some tables provide for a variety of units based upon average length; others make allowances for handling and set-up time distinct from pulling time. Here we have presented the data in a simplified form to represent conditions normally encountered on the average job.

Two units are given for each wire size, Standard and Short. When "pricing" the wire items on the pricing sheet, the total length for each wire size determines the applicable unit. If the total footage of a given size exceeds 500 feet, the Standard unit applies; if less, the Short unit should be used.

The wire installation units include all time for handling from job stock to the run, measuring, fishing, set-up and pull. They are not intended, however, to include installation under extraordinary conditions, runs of exceptional length, or long vertical runs. Such special conditions should have individual consideration for the special rigging and handling needed.

Handling time for wire and cable, it should be noted, is not directly related to the length of the run. Practical labor units, however, must be set up on the basis of the kind of take-off information available.

For wire, the take-off provides the length of conduit runs. This multiplied by the number of conductors and with the end allowances for connections added, gives the length of conductor. From job experience data, the total wire installation time can be allocated over the various sizes and lengths of conductors. The resulting units are necessarily loose averages from which the installation of any given run of cable may vary considerably.

Many contractors will spot check a single feeder or a few branch circuits and alter their units on the basis of the data collected.

Such time studies and spot checks are extremely valuable but the estimator should appraise them carefully through many "samples" before attempting to alter his units.

The specific conditions which affect installation time encounter many factors other than length of conductor. Handling from point of delivery to job storage depends upon weight, bulk, convenience of storage area. Handling from job storage to point of installation depends upon similar factors. On larger cables the set up time is affected by the way the cable is shipped, whether it is pre-cut to length, the surrounding conditions at the point of installation, and the set-up tooling, such as reel jacks and spindles, and pulling winches.

On branch circuit work, some runs are fished, others are pushed. Cable grips may or may not be used. Circuit complexity may require frequent checking against working drawings. Such considerations are only partly affected by the length of the conductor being installed.

As in many other sets of units, however, a large number of separate operations of wire installation tend to average out, and units based on the length of conductor become practical.

In the units presented, the time for wire installation includes the work normal to pulling the wire into place. Cutting, dressing, splicing, skinning and connecting time is allocated to the unit for the device or apparatus to which the wire is connected.

Enclosed Switches

Units shown for installing and connecting enclosed switches apply to conventional safety switches and circuit breakers, involving a conductor of appropriate size connected to line and load terminals. Units include locating, mounting and connecting. No fastenings, however, are included and appropriate time must be added for the type and number of fastenings required.

For meter cabinets, without current transformers or special connections, the units for enclosed switches will also apply.

It should be noted that connecting time on switches and panelboards is affected considerably by the design details of the apparatus. Type and accessibility of connections, gutter and wiring space and similar details can influence installation time by as much as 25 percent. This is one reason why it is important for the estimator to control the choice of particular make and design of apparatus selected for the project. Cost differences in the labor columns are often more important than the price differences of competitive lines.

Panelboards

Units for cabinets and panel interiors are presented separately and must be combined for each panel. To use the units, list each panelboard separately giving cabinet area, mains and branches, then apply the units and extend. For example:

Power Panel	P2		unit	ext
Cabinet	4 sq. ft.		1.00	1.0
Mains	4 wire	200 amp.	6.90	6.9
2	3 wire	60 amp.	2.50	5.0
2	3 wire	30 amp.	1.85	3.7
4	2 wire	sp. 15 amp.	.30	1.2
	Total			17.8 hours

It will be noted that a unit is included for spare circuits. This unit allows for the increased size and weight of the panel but does not include any wire connections.

No distinction is made here between small load center panels and the larger types since these units are intended to apply to average conditions.

Service Fittings

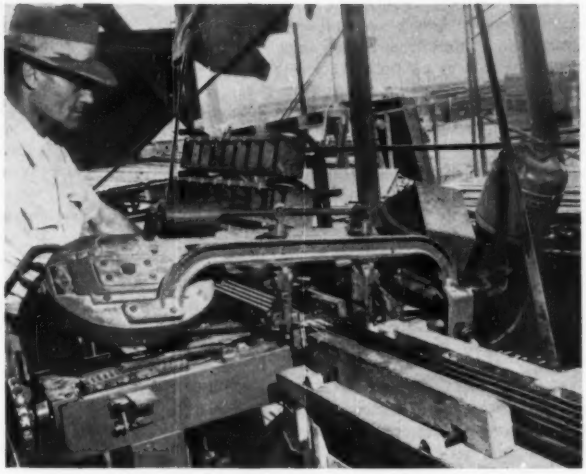
Tables shown for service entrance heads and ells apply to such fittings installed under normal conditions. For high work or other unusual conditions, appropriate addition should be made.

All labor unit data in this series are presented in man-hours. They should not be confused with dollars and cents. One simple way of distinguishing on the pricing sheet is to extend only to the nearest hour or the nearest 10th (as in the panelboard example). To find dollar cost, multiply labor-hours by the average hourly wage rate for the project.

MASS PRODUCTION

Prefabricated conduit runs, specialization on the part of installation crews and practical construction methods contributed to the significant wiring records established on this huge Los Angeles housing development.

By
John J. Howard
Vice President and General Manager
California Electric Construction Company
Los Angeles, California



MOTOR-DRIVEN BAND SAW cut eight ½-inch conduits simultaneously in 2 minutes. Conduit used on the job totaled 236 miles and carried over 700 miles of wire. After cutting, conduit went to . . . . .

THE Metropolitan Life Insurance Company's $60,000,000 Parklabrea housing development is an impressive construction project consisting of eighteen 13-floor buildings with a total of 2754 apartments. In keeping with the vastness of this enterprise, the electrical bill of materials is imposing; two of many examples being 1,250,000 feet of conduit and 3,691,000 feet of wire.

But the electrical significance of the project concerns neither quantities of materials nor uniqueness of equipment. Rather, it pertains to production-line prefabrication methods developed by The California Electric Construction Company.

Mass production was a logical approach to this vast project for, except for first-floor lobby provisions, all floor plans and apartment facilities were identical in the 18 buildings. Each of these 216 "typical floors" called for 5500 feet of conduit, consisting of 350 individual sections having a total of 500 standard 90-degree Ls with 3-inch radii. Quantities of other materials likewise were standard for each floor, with identical locations for outlets, panels and duplicated items of equipment.

For rapid conduit prefabrication, a 12-man shop team was organized. Conduit of the required size (principally ½-, ¾- and 1-inch black enamel) was taken from stock in "typical floor" lots and conveniently racked near a motor-driven metal-cutting band saw. Thread protectors and couplings were removed and, in groups of eight, conduit was cut to length in accordance with a "typical floor" assembly schedule. Each group of eight ½-inch conduits required two minutes for cutting.

Two electric pipe threaders kept pace with the cutter. Equipped with automatic chucks, thread counters, reamers and means for lubrication, each machine threaded and reamed a ½-inch pipe every 8 seconds. The next step was bending, with two men working exclusively on ½-inch stock and a third man taking care of all sizes other than ½-inch. Such conduit often ranged to 4-inches in diameter. Except in cases of emergency where a key section of conduit required immediate special attention, benders concentrated on a single operation until conduit for a complete floor or area had been readied for installation.

After bending, conduit was sealed and coded by means of numbered paper discs held in position by end bushings. These paper seals had a dual purpose; designating the ultimate location and preventing concrete, dirt or debris from clogging the conduit during delivery or storage.

Constant checking prevented wasted materials by minimizing errors in fabrication. This was facilitated by typical schedules of material requirements being posted at each saw, threading and bending machine.

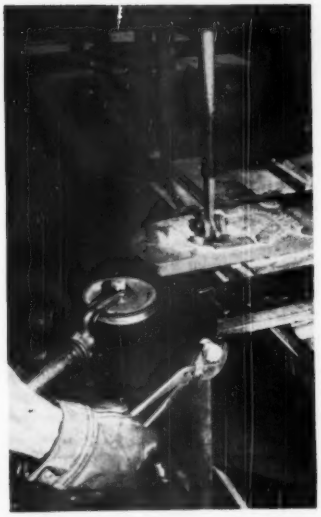
As conduit was prefabricated, it was stacked in plainly coded racks, then bundled in typical-area lots, tagged for location, and delivered by trailer to the proper building. On arrival at the specified job site, bundles were hoisted by crane to the proper floor and racked temporarily on hooks placed over the edges of wall reinforcements. From these racks, conduit was taken as required by the installation crews.

This prefabrication set-up was fast and accurate. The 12-man shop crew turned out material at an average of

WIRING METHODS

ELECTRIC PIPE THREADER, with automatic chuck, thread counter and reamer. A ½-inch thread was completed every eight seconds. After conduit was threaded, it was ready for . . . . .

BENDING OPERATION in accordance with "typical floor" schedule of material. Two men worked exclusively on ½-inch conduit while a third man bent all other sizes. As lengths were bent . . . . .



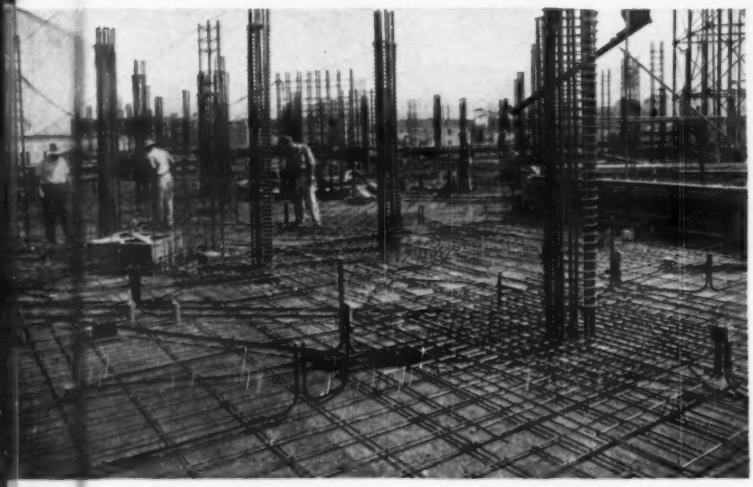
ENDS WERE NUMBERED and sealed by paper discs held in position by bushings. Paper caps served double purpose of identifying installation location and keeping conduit free from debris. . . . .

COMPLETE ASSEMBLY of sections was completed in prefabrication shop before despatching to the actual job sites. Accuracy was insured by frequently checking schedules and using . . . . .

LABELED RACKS for holding conduit of various shapes, lengths and diameters. Conduit was bundled in "typical floor" lots, tagged and delivered by trailer to the designated buildings.

OUTDOOR STORAGE was feasible due to normal long rainless period in the area. Necessity for constructing extra shops and warehouses and installing artifical lighting was eliminated.

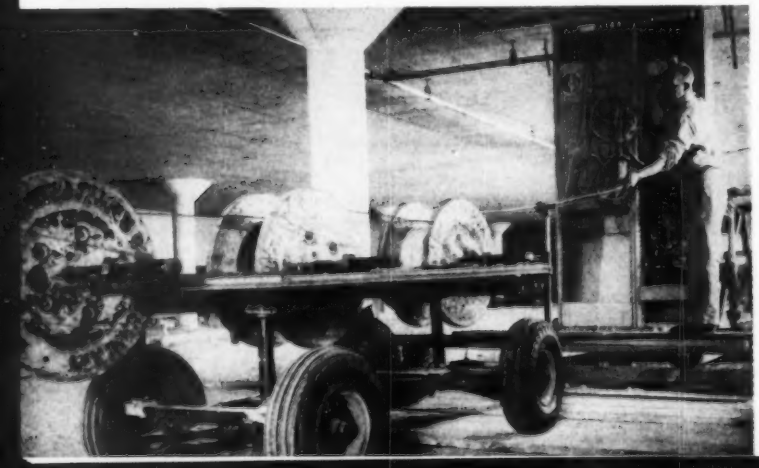
RIGHT ANGLE BENDS in angle irons were made by shearing 90-degree notch from one flange and bending other flange.



METAL TEMPLATES were slipped over turned up conduit ends, holding adjacent runs in exact related position until secured by the pouring of concrete decks. Guide plates and U-bolts served similar function.

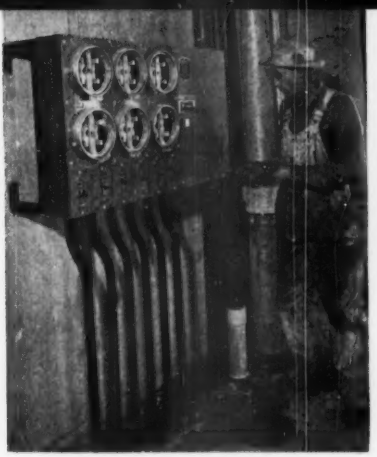
WIRE TRUCK held three 5000-foot reels. Rubber tired wheels permitted carriage to be moved close to points of wire utilization. Platform on truck facilitated wiring of ceiling outlets.

TRAILER OFFICES for foremen in various areas are connected by phone to project office, prefab shop and storage areas, permitting foremen to order material or discuss work without leaving their assigned areas.

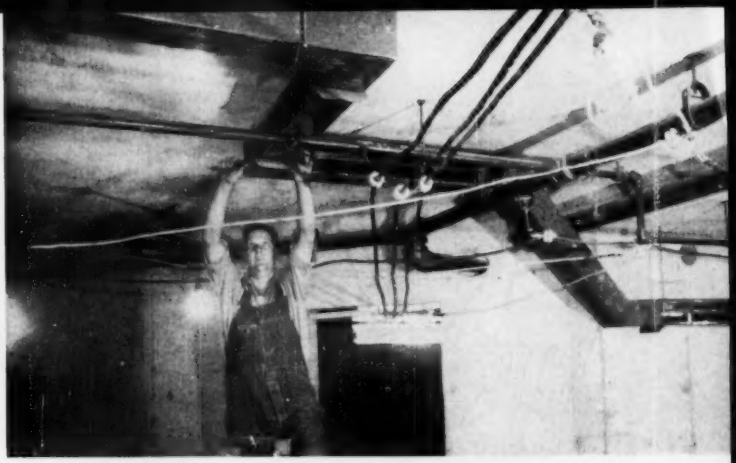


two typical floors a day. Less than 1% of the conduit used during installation had to be cut, threaded or bent at the actual job site, and this 1% generally was associated with between-floor risers rather than with horizontal slab-based runs.

In organization, the 12-man prefabrication team included one operator for the motor-driven saw, two for the electric threaders, three for bending, two for assembling, two for bundling and tagging, one for stripping conduit and loading the trailer, and one man for delivering the bundles to the various buildings.

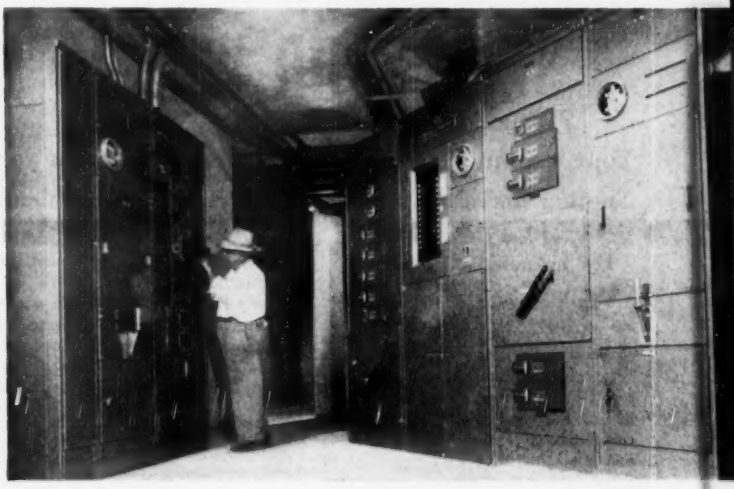


METERS AND BREAKERS for individual apartments are located on the various floors, permitting common feeders.



LARGE METAL RACEWAYS on ceilings of basements and through service areas carried power cables. Vertical and horizontal offsets were used to by-pass obstructions and change elevation of runs.

CALIFORNIA ELECTRIC CONSTRUCTION Company's J. B. Shamel (president) and J. J. Howard (v. p. and general manager) were in constant personal touch with all electrical details during construction.



MAIN SWITCHGEAR and meters for each separate building were located in basement vaults. Construction was entirely dead front. Service entrances were underground through duct.

AIR VIEW OF PARKLABREA development indicates extent of $60,000,000 housing project. Present contract includes eighteen 13-floor apartment buildings and seven garages. Project will house 2754 families.

It is pertinent to also note the assistance of southern California's typical weather. For, with a normal 9-month period with negligible rainfall, it was feasible to store materials and set up many of the production operations outdoors, protected only by a surrounding wooden fence. Thus, working space was practically unlimited, and savings were effected through the elimination of extra warehouses, shops and artificial lighting systems.

The size of the project resulted in large-scale purchase orders, shipping

(Continued on page 206)

HE LISTED every claim he had made and alongside all the benefits.

SELL FOUR WORDS

Your customer needs a reason for buying from you. Another narrative article on today's selling problems.

By Francis W. Sullivan

THERE comes a time in nearly every electrical contractor's experience when he finds that, too often, he is failing to land business he had confidently expected to get. When this situation continues too long, some men meet it by the easy expedient of price-cutting, thus damaging their own reputations as well as the entire industry in their vicinity. Others see falling volume as a red danger signal warning them that there is something fundamentally wrong with their methods. Such men immediately set about locating the trouble and taking the necessary steps to correct it.

This was the situation that faced Tony Farrell when he left the offices of the Acme Metal Products Company without getting their order for twelve motors on which they had requested bids. He knew Jacobs the purchasing agent well from having done the wiring job when they rebuilt their offices after the war, and he believed he would land the contract. But today Jacobs had merely listened to his enthusiastic descriptions of the motors he offered and asked him to leave a copy of his proposal. This indicated that price would be the deciding factor, and Tony knew at least six competitors who would underquote him.

Tony knew what the score was in the electrical contracting business. For the two years after he had set up the Farrell Electrical Maintenance and Supply Company, following his discharge from the Navy, conditions had been a seller's dream. Landing a few sizable contracts requiring high priority materials, he had made a lot of money. But lately, as supply caught up with demand and tough competition developed, his volume of business and margins of profit had both fallen off sharply. He didn't seem to be able to sell successfully under the new conditions.

The Acme Metal Products order was only one of several similar cases. In this section of southern New England, there were many machine shops and machine tool manufacturers, and Tony had specialized in selling to this trade. He had established good relations with them, and made it a point to handle and recommend nationally known products for their requirements. Experience had taught him that such products usually gave superior service, but they sometimes also affected the prices he was able to quote. That was the case now.

Facing his financial problem honestly, Tony saw that conditions in the trade, including tough competition, were now about normal, and would remain so for some time. In his area the same customers and prospects were in business, they needed the same materials, and they contined to buy them. No change there except that they didn't buy from him, as often as formerly. That pointed the finger directly at Tony Farrell. Like it or not, he just wasn't a good enough salesman!

What was the matter with his sales-

HE WALKED the floor practicing the sale on his long-suffering wife.

manship? In this Acme case, he knew they needed a dozen motors to replace older types that were causing trouble as the result of heavy war and postwar production. Farrell knew motors thoroughly, and was enthusiastic about the features and design of the line he carried—the new shaped slots that permitted coils to be slipped into place without stress, the freedom from dirt and moisture, the new materials used in construction, and the inherent precision lineup which resulted in far fewer failures. He knew his motors would outperform in many ways the motors that were being replaced. Yet he had been unable to convince Jacobs, the purchasing agent. He admitted that enthusiasm alone wouldn't overcome a 10% lower competitive price, if it was based solely on the knowledge of his product.

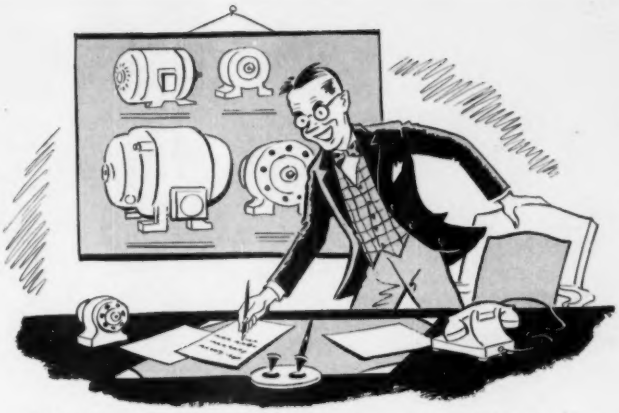
Tony's thorough knowledge of his products was offset by an equally complete ignorance of skilled selling. Up to now there hadn't been much need to use it. His only information along this line had been gained from occasional calls made with wholesalers' salesmen. On those occasions, he had sat back and let the other fellow do the work, hence had gained very little from them.

He thought of calling for such help now, but decided against it. He would never learn how to sell if he kept dumping his problems in somebody else's lap.

Now, sitting in his pleasant little office with its fresh linoleum tile floor, fluorescent lighting and furnishings bought during better days, he called on his common sense. He put himself in the place of the Acme Metal Products Company.

After all, why *should* they buy his motors—or anybody else's, when you came down to it? Only because one line of motors would solve their production problems better than all the others. Obviously, he had failed to convince Jacobs that his line would meet this requirement. All he had done was give a detailed catalogue of the features of his product and left it to Jacobs to figure out what they meant in terms of benefits to the business.

Benefits to the business! That was it! That was what Acme was looking for. Acme wasn't interested in trademarks or reputation or design or drop-shaped slots—except incidentally. And claims of longer life, lighter weight, greater strength, fewer failures were the same old claims that everybody made. Acme wanted to know *what these features would do for them*—wanted to see benefits in terms of profit dollars, the only reason Acme was in business.



WHEN HE got the order, it occurred to him that price had hardly been mentioned.

Tony Farrell grabbed a sheet of paper and began to jot down the benefits his motors would give Acme or any other prospect. He set down every claim he had made to Jacobs and alongside of it all the benefits, As the list grew, he asked himself what means he could use to spell out most effectively those advantages in terms of Acme's business. A phrase came into his mind: four simple words that seemed the answer—"This Means to You." As a guide, he put these words above his list of benefits. When he had finished, the list looked something like the one below.

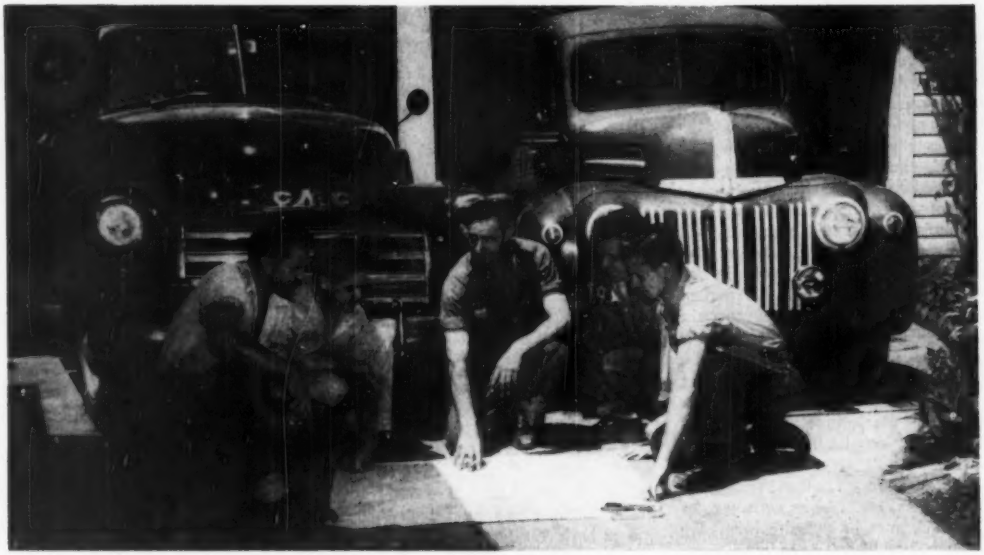
Rather amazed at what he had been able to work out in half an hour, Farrell wondered next how best to organize these dollars and cents benefits in the form of a sales talk. Keeping his phrase—"This Means to You"—always in mind, he imagined himself back again in Jacobs' office, attempting to sell him. He tried the first point.

"Mr. Jacobs," he began. "when you install these newly designed motors you will have fewer motor failures, due to the way they are made. This means to you fewer replacements and fewer repairs. That, in turn, means reduced labor costs, less interruption of work and more continous produc-

(Continued on page 205)

THIS MEANS TO YOU

Product Feature	Operating Benefit	Final Benefit
1. Fewer motor failures	Fewer replacements	Lower costs
	Fewer repairs	Lower costs
	Fewer interruptions of work	More production
		Greater profit
2. Lighter weight, smaller size	Easier to handle	Reduced expense
	Time saved	Safety of men
	Labor cost saved	Convenience
3. Easier accessibility for repair	Time and labor saved	Reduced expense
4. Greater strength	Longer life (durability)	Reduced expense
	Dependability	Greater output
5. Economical operation	More work at less power cost	Greater output
		Reduced expense
6. Adaptability to varying loads and conditions	More efficient operation	All these in the end mean more profit
	Greater safety	
	Continuous operation	



1. Briefing crew at start of day. Contractor Fromme (center) uses city map to show electricians areas in which the day's installations are to be made.

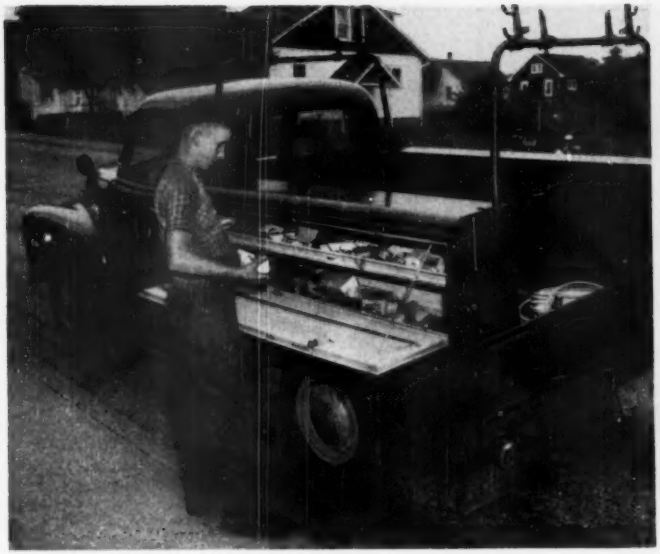
4. Power tools are used wherever possible to cut installation time. Here, basement beams are drilled for bx circuit run.

5. Grinder control circuit is connected to a flow switch in the basement water pipe leading to the kitchen sink.

INSTALLING 1,300 FOOD WASTE DISPOSERS

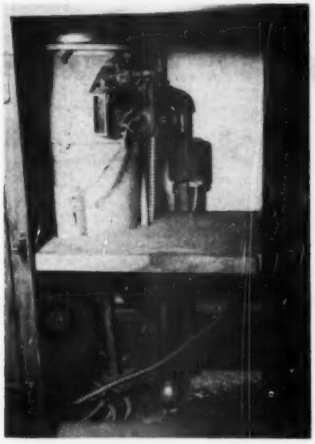
Jasper, Indiana goes 100 percent to electric food waste units. Here's how the contractor solved installation problems posed by single-circuit wiring distribution.

By August Eckel



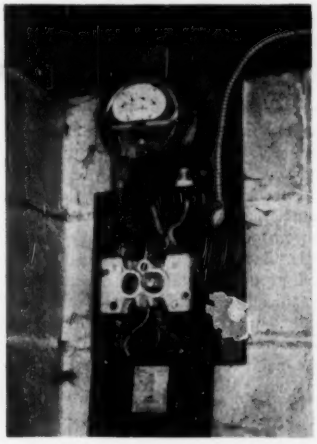
2. Everything is ready when the truck rolls up to a home. All necessary tools and materials are carried in good supply in the truck.

3. No spare fuse so grinder circuit is tapped to existing panel.



6. Food waste grinder under sink has two cable connections. One is for circuit; the other for flow switch control.

7. Final check on a food waste disposer unit is made by contractor Fromme while he briefs housewife on its operation.



8. Two branch circuits serve this home. One is for the food waste grinder. The other serves other loads in the house.

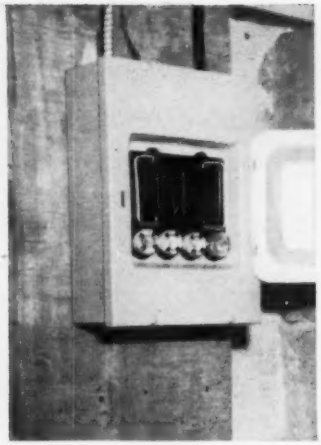
CITIZENS of Jasper, a quiet industrious city of 6,000 population in Southern Indiana, no longer have a food waste disposal problem. In each home is a spanking new electric grinder that flushes pulverized waste down the drain.

A decision to go all-out for the grinder disposal method was reached last year. The municipality was about to build a sewage treatment plant to meet stream pollution regulations. At that time it also faced a garbage pick-up problem since farmers lost interest in collecting and using the waste for hog feed. After a spot check of home owners, Mayor Herbert E. Thyen conceived the idea of designing the treatment plant to accommodate 100 percent grinder saturation and subsequently eliminate food waste collection.

Following exhaustive investigation of available units and performance tests, the city purchased the grinders from a single manufacturer on a sealed-bid, delivered - and - installed "package" basis. Home owners were given the opportunity of purchasing their units at an exceptionally low cost. There was no municipal financing of disposer installations. Result: approximately 1,300 units are installed and the city will save up to $13,000 annually on food waste collection.

A dominant factor in the low cost to the home owner was the efficient organization for handling installation. Citizens signed up and paid at the city office. The manufacturer's project

9. Outdoor connection to porch-mounted meter was typical method used in one-circuit homes. Grinder circuit is protected by 25-amp. fuse in box at right and connected to load side of meter.



10. New service panel installed at owner's request has 60-amp. main fuse; future range circuit switch and four branch circuits—one used for grinder.

engineer took over from there; assigned installation orders to four plumbing and two electrical contractors; made final inspections and tests. To facilitate installation in old style sinks with small drain openings, a special cutting tool was developed.

Of the two electrical contractors involved, Edward J. Fromme made the majority of installations. To meet the city deadline for elimination of food waste collection, Fromme used two trucks, each operated by a two-man crew and fully equipped with power tools and the necessary materials. Each day he briefed his crews and grouped installation orders geographically to reduce travel time. Normally, within 24 hours after the plumber installed the unit, Fromme's men had it connected and the housewife was using the grinder.

Wiring Problems

Antiquated wiring in most of the homes complicated the grinder electrical installation. Although the municipal power company changed from an ungrounded 110-volt 2-wire system to single-phase, 110/220-volt, 3-wire distribution in 1922, some 370 homes still have a fused-neutral service switch. About 70 percent of all homes had only one branch circuit.

Normal service to a home consisted of two-lead-in wires with the service cable dropping indoors to a 30-ampere switch, then outdoors to a meter located under the porch roof, then back indoors again with a single circuit.

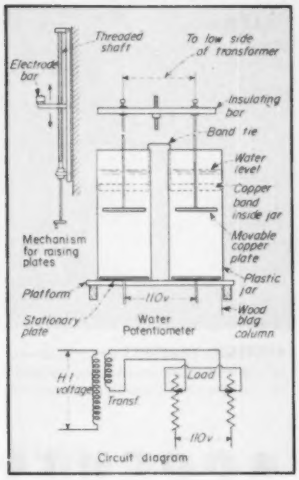
To overcome these obstacles, Fromme and the manufacturer's engineer decided to run a No. 12, two-conductor circuit from the grinder back to the load side of the meter. Where no spare circuit capacity was available, the contractor provided circuit protection with a 25-ampere fuse in a Fusetat box cover unit on a 2½-inch "handy" box. If possible, this was mounted adjacent to the indoor fuse panel. Otherwise, it was mounted adjacent to the meter under the porch roof.

Grinder motor operation is controlled by a flow switch mounted in the water line either adjacent to the unit under the sink or in the basement. After the unit is set for "operation", a flow of water in the sink faucet starts the grinder motor. When the faucet is closed, the grinder stops. To make a solid armored-cable connection to the thick walls of the switch enclosure, connectors with extra long threaded area were necessary. The control circuit goes from the switch to the grinder unit.

Information on the work orders noted availability of spare circuits and approximate length of circuit run. Electricians could walk into a home with all necessary materials and immediately start the installation. Such coordination between engineer and contractor enabled a team of electricians to complete an installation in the *average* time of 45 minutes.

It may well be that the Mayor's solution to a garbage disposal problem will open the door to higher home wiring standards and more electrical living convenience in the city of Jasper.

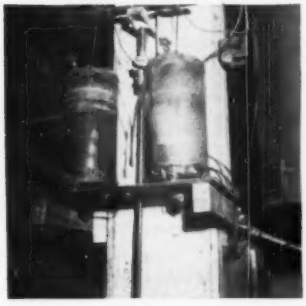
11. New 3-wire service sold by contractor is ready for future loads. Third conductor is coiled up until power company installs 3-wire drop.



DETAILS OF potentiometer design and construction.

VOLTAGE IS SET by turning hand wheel which raises or lowers movable copper plates in plastic jars. Unit is pushbutton controlled; has dual scale meter.

WATER POTENTIOMETER in low-voltage circuit of and adjacent to high-voltage test transformer provides desired voltage steps for ground testing on motors.



TWO PLASTIC JARS hold water for potentiometer. One jar is in each side of single-phase 110-volt circuit. Note mechanism from scissors jack used to raise and lower electrodes.

WATER POTENTIOMETER ON TEST TRANSFORMER

Voltage steps for ground testing of electrical equipment are provided by a water potentiometer in the low side of the high voltage transformer.

EVERY motor repair shop subjects its repaired and rebuilt equipment to a thorough ground test before it is shipped. Standard practice is to apply a minimum of twice the equipment rated voltage plus 1,000 volts. Methods of obtaining the various voltage steps will vary with the type of test equipment used.

At the Roy A. Berentz Company in Houston, Texas, a one kva., 110/12,000-volt, single-phase transformer is used for ground tests. To get the desired test voltage, a water potentiometer was installed in the low-voltage circuit of the transformer. By simply turning a hand wheel, the operator can vary the test voltage from zero to the 12,000-volt limit.

The potentiometer consists of two plastic jars, each 6 inches in diameter and 14 inches high. In the bottom of each jar is a stationary copper plate with connection to the 110-volt supply circuit. On the inside of each jar, about two-thirds of the way up, is a copper band. A tie-cable connects both bands. Each jar is filled with water.

Two movable copper plates, one in each jar, are connected by supporting rods to an insulated cross bar mounted to a raising and lowering mechanism. Each electrode rod passes through the jar cover and has a terminal for connection to the low voltage cables of the transformers. As the movable copper plates are raised, the resistance in the circuit increases, states shop superintendent L. B. Davenport. Total range is from zero when the plates are at the bottom to approximately 20,000 to 30,000 ohms at the copper bands. Above the bands, the resistance approaches infinity.

The screw mechanism from a scissor type auto jack is used to raise and lower the electrode cross-bar. A long extension shaft with a hand wheel permits easy operation.

A pushbutton control in the low voltage — and potentiometer — circuit operates the test transformer.

BRIGHTLY LIGHTED show windows invite customers into entrance of Irvin's Department Store in suburban Baltimore. Both fluorescent and incandescent lamps are used to light the displays efficiently and attractively.

RECESSED TROFFERS using three rows of 40-watt fluorescent lamps shielded by louvers and supplemented by wall

LIGHTING ACCENTS

Baltimore department store integrates lighting with interior store design to attract customers, sell merchandise quickly, promote safety and provide individuality to the store.

THE newest of the Irvin's Department Store chain in Baltimore, Maryland, is located on Harford Road in a suburban community center. Designed by Kelly & Gruzen, New York architects, it successfully combines lighting with overall design to attract customers to the store and to facilitate sales.

Before preliminary plans were drawn, consideration was given to the lighting as a function of the store design. It was decided that properly planned lighting would offer the greatest influence in attracting attention to the store, in selling merchandise quickly, in providing individuality to the store, and in competing with neighboring stores in this small business center.

The store consists of a first floor and basement. The building is L-shaped, is 136 feet long, with 26-foot width at the front and a 42-foot width at the rear. Two long show windows flank the entrance to the store. The first floor ceiling is plaster and is eleven feet six inches from the floor, while the basement ceiling is acoustical tile and is nine feet from the floor.

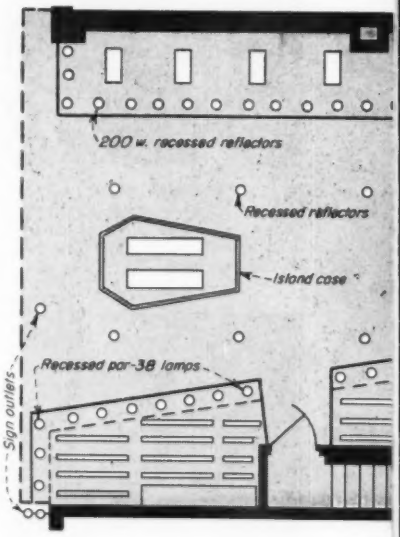
The store front attains initial attracting power by means of a block letter neon sign set on the face of a light green finished corrugated metal building facing installed above the show windows, and by means of a projecting solid face sign at one end of the front.

A different lighting treatment is used in each of the two long show windows. The window on the right is lighted with a Garcy louverall ceiling and with 17 150-watt R40 spotlamps in Gotham recessed units. Fluorescent continuous reflector strips spaced on twelve-inch centers provide diffuse lighting over the louverall ceiling panels.

The window on the left has a slightly higher ceiling than the one on the right, and is illuminated by 21 recessed Pittsburgh silver mirrored glass 200-watt reflectors equipped with parallel louvers. This lighting is supplemented with seven recessed louver bottom Kent Metal Co. troffers, each equipped with four 20-watt fluorescent lamps.

The combination of fluorescent lamps for diffuse lighting and of incandescent lamps for accent and punch lighting in each window provides ideal high intensity illumination of good color quality, for attracting customers into the store and for critical inspection of the merchandise displays in the windows.

Many lighting treatments were considered for this store. Among these was accent lighting. In view of the many types of merchandise to be displayed, however, it was decided to provide an abundance of diffuse light over the entire area of the store so that customers could select and appraise the



LIGHTING PLAN of show windows and store front area are shown above in detail, while general lighting arrangement throughout the entire store area is shown in smaller detail (right).

and floor case lighting provide 75 footcandles average in basement floor sales area.

PATTERN DESIGN ceiling luminaires produce 100 footcandles of diffuse direct light on main floor merchandise displays. Floor and wall cases and wall display niches are brightly lighted by fluorescent strip lights.

SUBURBAN STORE

By Berlon C. Cooper

merchandise more easily and quickly.

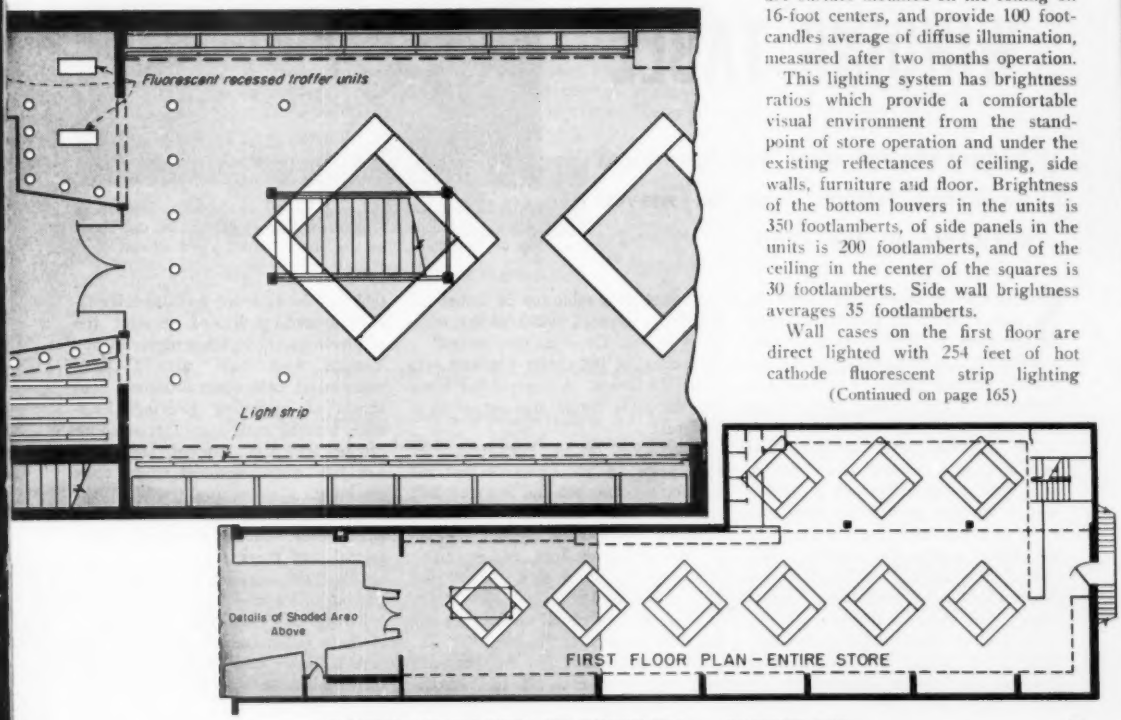
A patterned direct lighting system using Mitchell Module "D" equipment was selected for lighting the first (main) floor area. This system was selected since it would light the area efficiently and would provide individuality and contrast with neighboring stores. Other stores in the neighborhood are lighted with continuous row and individual unit fluorescent luminaires, and by various types of incandescent units.

The Module units are laid out in squares, with the squares installed at a 45-degree angle with the main axis of the store. This arrangement gives a diamond effect layout. Each square consists of four 4-lamp 75-watt T-12 slimline units, using 4500-degree K. lamps operated at 425 milliamperes. Nine of these square-patterned units are surface mounted on the ceiling on 16-foot centers, and provide 100 footcandles average of diffuse illumination, measured after two months operation.

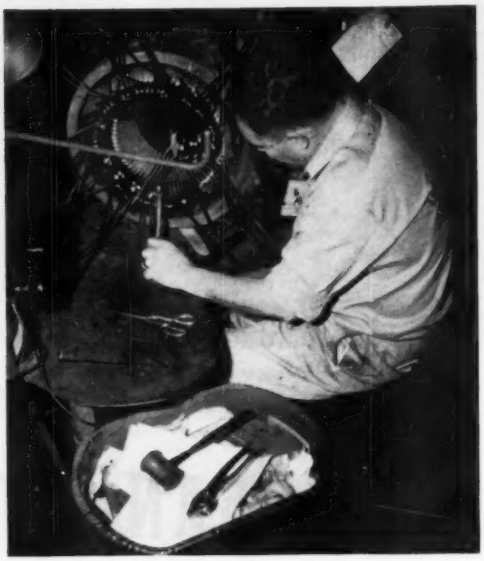
This lighting system has brightness ratios which provide a comfortable visual environment from the standpoint of store operation and under the existing reflectances of ceiling, side walls, furniture and floor. Brightness of the bottom louvers in the units is 350 footlamberts, of side panels in the units is 200 footlamberts, and of the ceiling in the center of the squares is 30 footlamberts. Side wall brightness averages 35 footlamberts.

Wall cases on the first floor are direct lighted with 254 feet of hot cathode fluorescent strip lighting

(Continued on page 165)



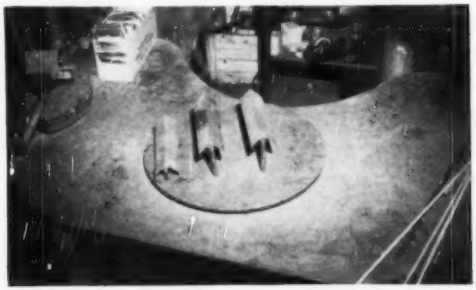
KIDNEY-SHAPED steel winding table can be moved anywhere in the shop; contains all materials and tools necessary for the job; has two adjustable local lights; tends to reduce fatigue.



SWING-OUT TRAYS hold tools and accessories; can be tucked under table when not in use. Note how table top is cut out to permit winder to stand or sit closer to stator.

MOBILE WINDING TABLE

Kidney-shaped steel bench reduces mechanic fatigue; can be moved anywhere in the shop.



ANGLE-IRON SADDLES on stator turntable hold motor frame securely in place. Different lengths of saddle pins and spacing of turntable holes are for different sized stators.

STATOR winding in the motor repair division of Dowzer Electric Machinery Works, Inc., at Mt. Vernon, Ill., is done under an exceptionally flexible system. The work can be moved to the winding table, or the table can be moved to the work.

The Dowzer table, designed and built by shop foreman H. Ray Wilson, is of steel construction with a kidney-shaped top that permits the mechanic to sit or stand close to the stator; has four heavy casters for mobility; contains all the necessary tools and equipment as well as several innovations to make the winder's job easier.

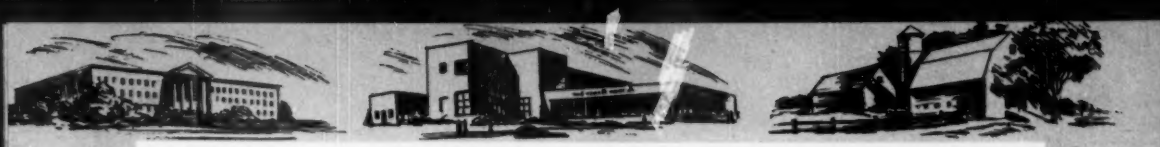
Four stout legs of 2-inch conduit, with 1-inch angle-iron bracing and 2½-inch steel casters, support the ¼-inch steel plate table top 36 inches off the floor. Overall width of the table is 54 inches. Depth at the "wings" is 37 inches; at the center (cut-out section), 23 inches. A conduit bar bracing the table frame also serves as a foot rest.

Stators rest on an 18-inch diameter steel plate (¼-in.) turntable that rotates on a center pin and five steel ball casters; are held securely in position by "saddles" made from 8½-inch lengths of inverted angle-iron (1¼-in. size) welded to two steel pins. These pins fit into a series of holes in the turntable, drilled on center to fit the various sizes of stators.

Two goose-neck local-lights are mounted, one on each side of the turntable, to the table top by adjustable C-clamps and positioned to suit the winder's specific lighting requirements. Vertical steel rods, also C-clamp mounted at convenient locations, hold spools of insulating sleeving, lead-wire, binding cord and other winding accessories, also support adjustable steel bar "arms" on which wound coils are hung.

Tools and other accessories are kept within easy reach of the mechanic in special steel trays (17½-in. by 13½-in. by 3¼-in.) that swing under the table and out of the way when not in use.

Dowzer mechanics have built several of these self-contained units and find them a highly efficient addition to the shop equipment.



TO REASSURE YOU AT THIS CRITICAL TIME

WE RE-EMPHASIZE THE

WESCO CODE of BUSINESS PRINCIPLES

WHICH HAS SERVED OUR CUSTOMERS FOR 28 YEARS

Today, again, Americans are living in a world disturbed, and amid conditions which menace the life of this nation. No one can clearly foresee the end of the avenue down which events are marching us. But mutual confidence among individuals and among businesses will strengthen the welfare of our country. Therefore, we in WESCO believe it is timely to re-declare the long-standing business principles which shall continue to guide us in the months and years to come. Those principles are as follows:—

1. WESCO WILL NOT

a. Engage in speculative buying.

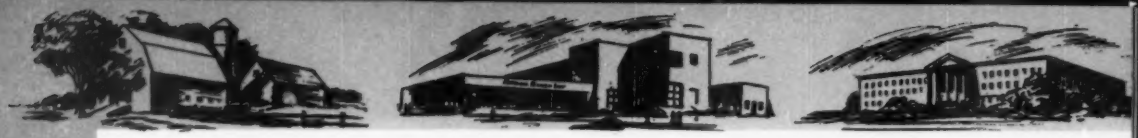
b. Hoard products or materials.

c. Put pressure on suppliers for more than a fair share of their production.

d. Raise prices to its customers unless forced to do so as a result of increases from our suppliers or for other unavoidable and legitimate reasons.

Westinghouse Electric Supply Company

A NATIONAL DISTRIBUTING ORGANIZATION WITH 107 BRANCH OFFICES



WESCO CODE of

e. Press customers to buy above their actual needs.

f. Be a party to black market or profiteering operations, or other transactions which would violate the spirit or the letter of any law.

g. Alter the ethics and fair dealing policies which have built this business.

2. WESCO WILL

a. Remember that regular and longstanding customers are the bread and butter of this business and that they shall receive first consideration.

b. Endeavor to carry sufficiently complete stocks in all houses to supply reasonable demands. Thousands of products from hundreds of manufacturers are available at, or obtainable by, the WESCO house nearest you.

c. Assemble all parts of an order in one shipment, if desired.

d. Maintain fast and efficient flow of materials to a job in keeping with customers' work schedules or other requirements. Daily contacts with manufacturers enable us to fill your orders at maximum speed.

e. Aid in expediting materials ordered by our customers. Large hurry-up orders

Westinghouse Electric Supply Company

A NATIONAL DISTRIBUTING ORGANIZATION WITH 107 BRANCH OFFICES

BUSINESS PRINCIPLES

are frequently completed by pooling stocks from several of WESCO's 107 warehouses.

f. Work closely with electrical contractor customers and industrial plant personnel to select and apply the proper electrical products for the job.

g. Cooperate with all customers to boost the productive level of men and machines.

h. Offer engineering data, information on local codes and other technical service through WESCO specialists or the engineers of our suppliers.

i. Provide intelligent over-the-phone service by seasoned "inside men" who are experts in their field.

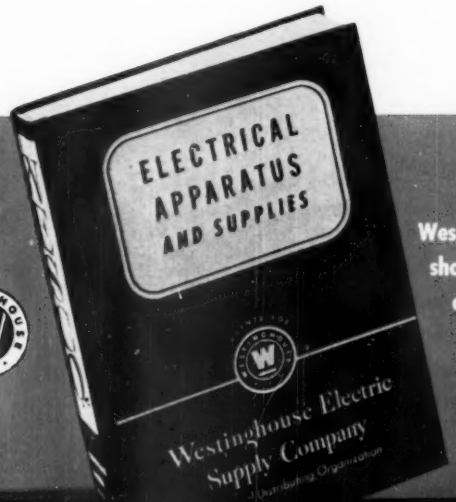
j. Quickly and easily arrange credit relationship with new customers.

k. Assure all customers that WESCO's low-price policy will be maintained and that WESCO's prices will be competitive.

l. Back every product in our stock not only with the manufacturer's guarantee but with WESCO's own assurance of quality, performance and satisfaction.

m. Extend courtesy, consideration and attention to every customer, large or small. Your interests come first with everyone on our staff.

n. ***Provide you with what you need—when you need it—where you need it—from one source of supply—conveniently located near you.***



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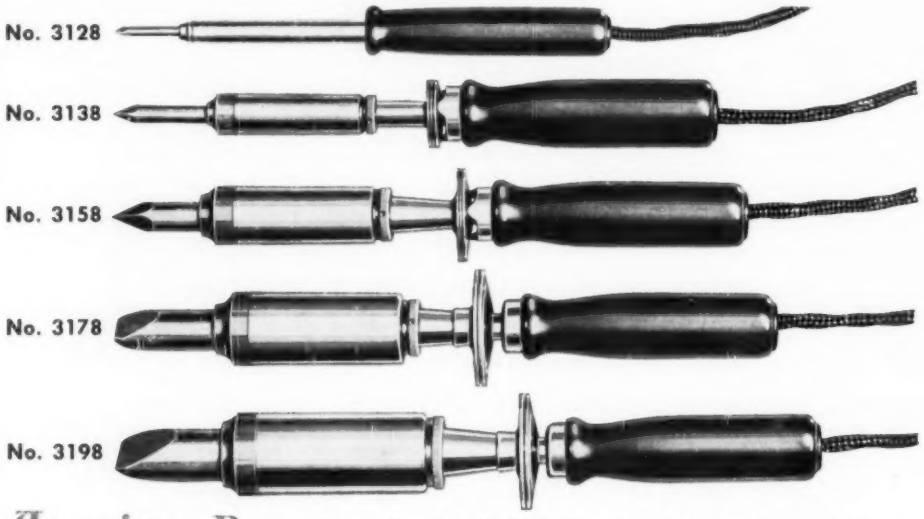
For Durability . . . Dependability . . . Efficiency

American Beauty

ELECTRIC SOLDERING IRONS

EMBODIED in these Electric Soldering Irons are those features of construction and design that specialized experience—since 1894—has demonstrated to be desirable for efficient and lasting service. Hundreds of thousands are in use throughout the world in a wide variety of manufacturing plants; in service, maintenance and repair shops; Army and Navy Services; in telephone, telegraph and radio stations. Because of their proven efficiency and durability, they are preferred by those who measure the value of a tool by the service it renders.

RELATIVE SIZES



American Beauty TEMPERATURE REGULATING STAND

This is a thermostatically controlled device for the regulation of the temperature of an electric soldering iron while at rest. When placed on this stand, soldering iron is maintained at working temperature, ready for instant use or, if desired, at a lower temperature. Through an adjustment on bottom of the stand, thermostat may be set for the maintenance of any desired temperature—from very low, or warm, to full working temperature. Body of stand is of molded plastic. Soldering iron cradle proper is of metal. Stand is equipped with cord and attachment plug-cap for connection to current and with a receptacle for connection of the electric soldering iron. It is designed for use with electric soldering irons up to 660 watts capacity and on circuits up to 240 volts.

Write for descriptive Catalog—Form No. 206-CP AMERICAN ELECTRICAL HEATER CO. Detroit 2, Mich.

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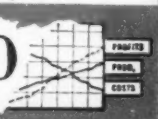

Pullout Type
Main and Range
Combination

Side Operated Enclosed
Knife Blade Type

Front Operated
Toggle Type

Fuse Cabinet

Outdoor—Raintight
Service Switch

The American
ELECTRIC SWITCH CORPORATION
Minerva Ohio.

Sales Office and Factory at Minerva, Ohio

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Write for our latest Catalog

SERVICE ENTRANCE EQUIPMENT

AMERICAN Range Switches—dead front type—115-230 volts—non-interchangeable hot moulded bakelite main and range pull-out heads—taps for hot water and up to 12 fused branch lighting circuits.

AMERICAN General Purpose Switches—side operated—knife blade type—two and three wire—quick break—fused—30 to 1200 amperes.

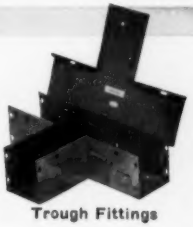
AMERICAN Meter-Switch-Fuse Sequence—front operated—toggle type—30 to 60 amperes—fused—2 to 12 branch circuit fuses—bell ringer transformer space optional.

AMERICAN Fuse Cabinets—Flush and Surface Mounting—2 to 24 circuit, 1 pole plug fuse branches—single phase, 3 wire and three phase 4 wire service.

AMERICAN Outdoor Meter Switches and Devices—side operated—knife blade type—weatherproof—for main line disconnect—standard hubs in top—quick break—fused—125 and 250 volts—2 and 3 poles—30 to 200 amperes.

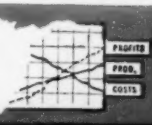
AMERICAN Wiring Trough and Fittings—3 to 8 inches wide—3 to 8 inches deep—hinged or screw cover—trough fittings also are available.

Wiring Trough



Trough Fittings

FOR COURTEOUS, INTELLIGENT SERVICE—CALL WESCO



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that you can use

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Durasheath* is the all-type cable for all-type use . . . in single or multi-conductors.

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Tough Neoprene jacket eliminates rotted braids and jacket damage when pulling.

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Ability of Neoprene jacket to resist oil, alkalies, acids, moisture, makes Durasheath the perfect cable for underground use.

in one continuous run!

DURASHEATH SOLVES DISTRIBUTION PROBLEMS . . . Underwriters' approved for all underground services . . . it's perfect for power and lighting circuits, industrial plants, mines, airports, farms, and housing developments.

DURASHEATH DOES THE TOUGHEST JOBS—THE BEST . . . *and at lower costs* . . . electrolysis, corrosion and extremes in temperature can't hurt it. It resists oil, flame, abrasion and cutting . . . as well as moisture, acids and alkalies in the soil. It's lightweight and flexible—reduces installation costs.

For more dependable power distribution systems, choose Durasheath. For more complete information contact your nearest Anaconda Sales Office or Distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

The right cable for the job ANACONDA®

WIRE AND CABLE

*Reg. U. S. Pat. Off.

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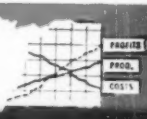

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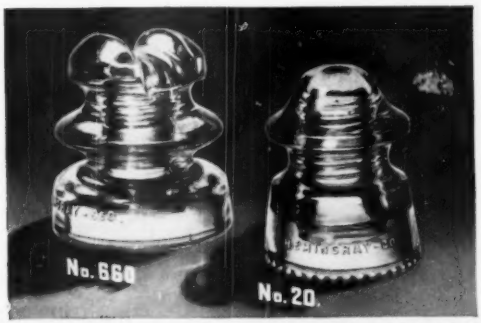
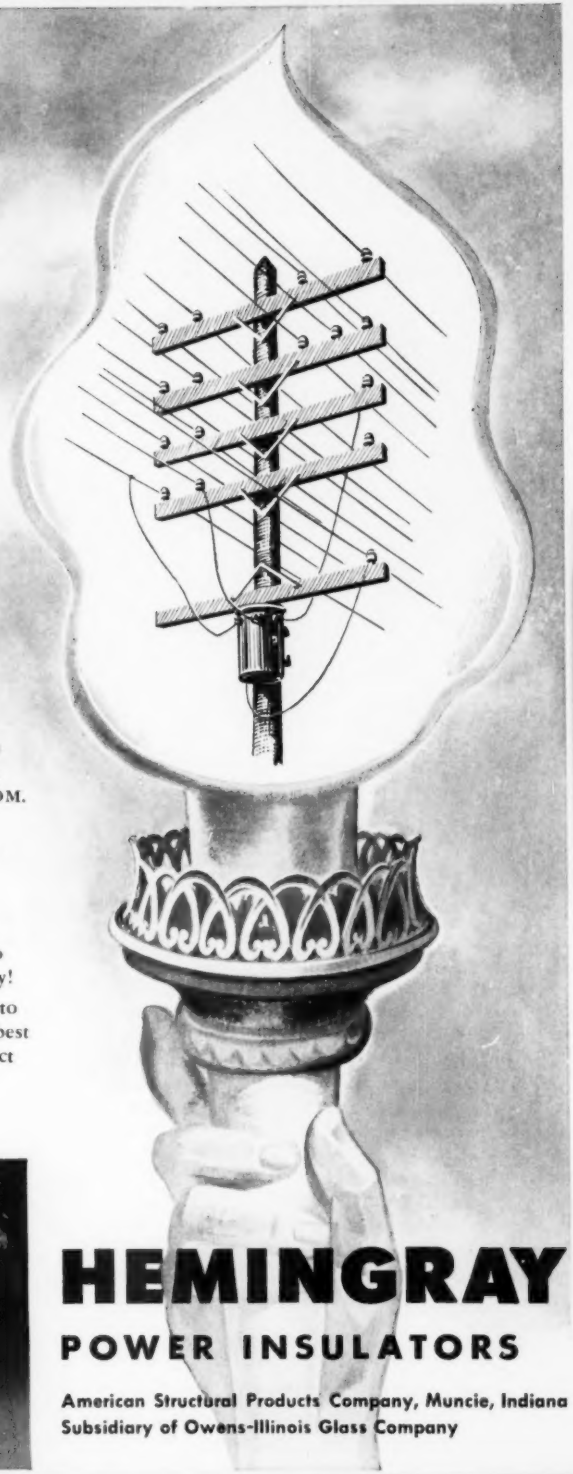
Not the kind of power Hemingray Insulators so ably protect on the power lines. We speak of the strongest force in America . . . FREEDOM. Where does *that* power come from?

You know. Freedom comes from what you do . . . and what we do . . . and what every American does.

So in these troubled and serious times, we reaffirm our belief in and determination to do business the American way—the freedom way!

And for us, that way is to pledge with you to keep America powerful and free—to do the best job we know how—to supply the best product we can make—to price fairly, service dependably and deal honestly with all.





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*Life-Linestarter**

Only one moving element — a seesaw balanced on a knife-edge

No complex linkages in the contact closing mechanism of the new Westinghouse Life-Linestarter, which is years ahead in its principle of operation. No sliding surfaces to bend. No lubrication needed. Nothing to stick or jam. The new principle, backed by 40 years of experience and perfected by more than 6 years of laboratory and field tests, opens the way to fewer outages, increased production, lower operating costs.

Compare this operating principle with that of other starters. Compare, too, for positive protection—compare the positive kickout spring which provides the force needed to open the contacts—for rapid, uniform action, independent of gravity. Also compare Life-Linestarter for uniformity and completeness of line, NEMA sizes 0 through 4, ease of installation and other key advantages.

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Life-Linestarter

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YOU NAME IT; WESCO HAS IT OR CAN GET IT

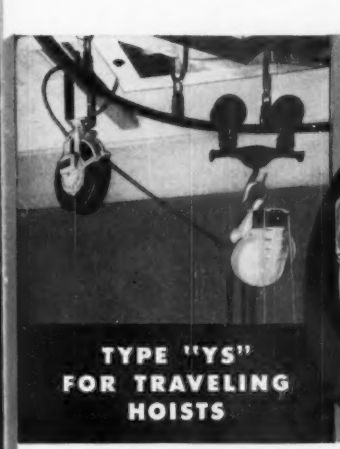
Positive Safety

FOR PLANT AND PERSONNEL

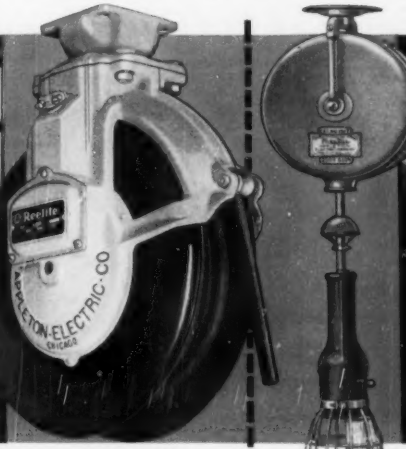
APPLETON REELITE

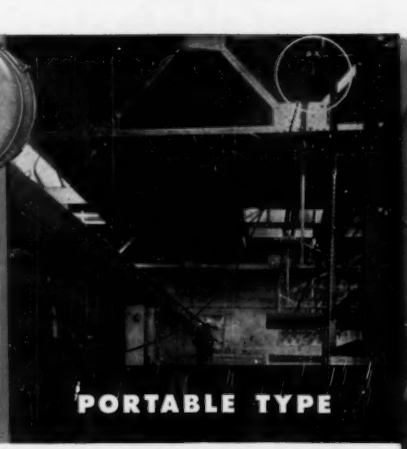
TRADE MARK

Automatically Takes Up, Pays Out Conductor Cable
Keeps Cord Reeled Up Safely Out of the Way



TYPE "YS" FOR TRAVELING HOISTS





PORTABLE TYPE

The Appleton Type "YS" Reelite for traveling hoists is built with a swivel base, permitting cord to be fed in any direction. Mounted at the mid-point, a Type "YS" Reelite equipped with 45 feet of cord will serve a stretch of track 90 feet long, straight or curved.

The Type "YS" Reelite eliminates the necessity for exposed current collectors, trolleys or wires. Outer cover easily removed to service brushes and power spring, or to make solderless line connections direct to terminal block. Oil-less bearings at all points of rotation.

RATING: 15 Amperes, 550 Volts A.C.; 250 Volts D.C.

The Appleton Portable Reelite takes light right where it's needed, in car-loading, stock-keeping, machine inspection, building maintenance—on hundreds of jobs that require bright, movable, safe illumination. Cord is paid out against spring tension and held to desired length by a ratchet stop. Works like a window shade. Cord is kept kinkless, tangle-free—safely out of the way when not in use, with never any excess underfoot. Helps avoid accidents, cuts cord maintainance costs to a minimum.

Sold Through Electrical Wholesalers

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14 Branch Offices and 7 Resident Representatives in all Principal Markets

SEND TODAY for free copy of new Bulletin 504. Fifty full pages describing Appleton Reelites shown here, plus special types and combinations for power tools, air and liquid lines. Or see Sweet's File. Page 2a/10a.

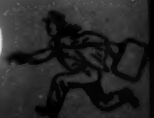
CONSTANT DUTY TYPE FOR HEAVY JOBS

Carries smooth, uninterrupted power to moving electrical machines. Automatically winds up and pays out rubber covered cable to cranes, hoists, elevators, lifting magnets, generator sets—heavy mobile equipment of every kind. Pays for itself in efficiency, safety, cable protection.

APPLETON

CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES • EXPLOSION-PROOF FITTINGS • REELITES

USE THE EXPERIENCE OF TRAINED WESCO MEN



For surest cable protection, specify—

BERMICO®

FIBRE CONDUIT

Scientifically Designed and Constructed to Provide Better Cable Protection, BERMICO *is always on the job!*

1 **LIGHT.** Easily handled on the job; one man can carry several 8-foot lengths at once—lay more per working hour.

2 **TIGHT.** All joints are precision milled for light, speedy, installations.

3 **STRONG.** Bermico Conduit is engineered to take the shocks and stresses of transport . . . the heavy loads imposed during installation.

4 **NO SPLIT COUPLINGS.** With Bermico's specially designed couplings, you end the expense—the loss of time required to replace broken couplings.

5 **WATER PROOF.** Bermico's water absorption factor is extremely low—its insulation factor extremely high, even under toughest conditions.

6 **ACID RESISTANT.** Resistant to soil acids and alkalies, Bermico Conduit is, itself, chemically inert.

7 **SMOOTH INSIDE BORE.** Quick and easy cable "pull throughs"—without danger of abrasions—when you're using Bermico *inspected* conduit!

8 **UNIFORM.** Four rigid factory inspections guarantee Bermico's uniformity of dimensions, specifications and quality.

Production facilities and schedules are geared to assure prompt shipments.

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WESTINGHOUSE ELECTRIC SUPPLY COMPANY

Offices in all leading cities

BERMICO FIBRE CONDUIT—A PRODUCT OF BROWN COMPANY

Mills—Berlin, N. H.

TO HELP YOU ON THE JOB **CALL WESCO**

FOR QUALITY ELECTRICAL SUPPLIES AND SERVICE

BRYANT OFFERS A COMPLETE LINE OF GROUNDING DEVICES

Designed for the grounding of exposed metal parts of portable appliances and electrical equipment, these devices protect against the hazards of electrical shock.

These devices may be used with either metallic or non-metallic wiring systems.

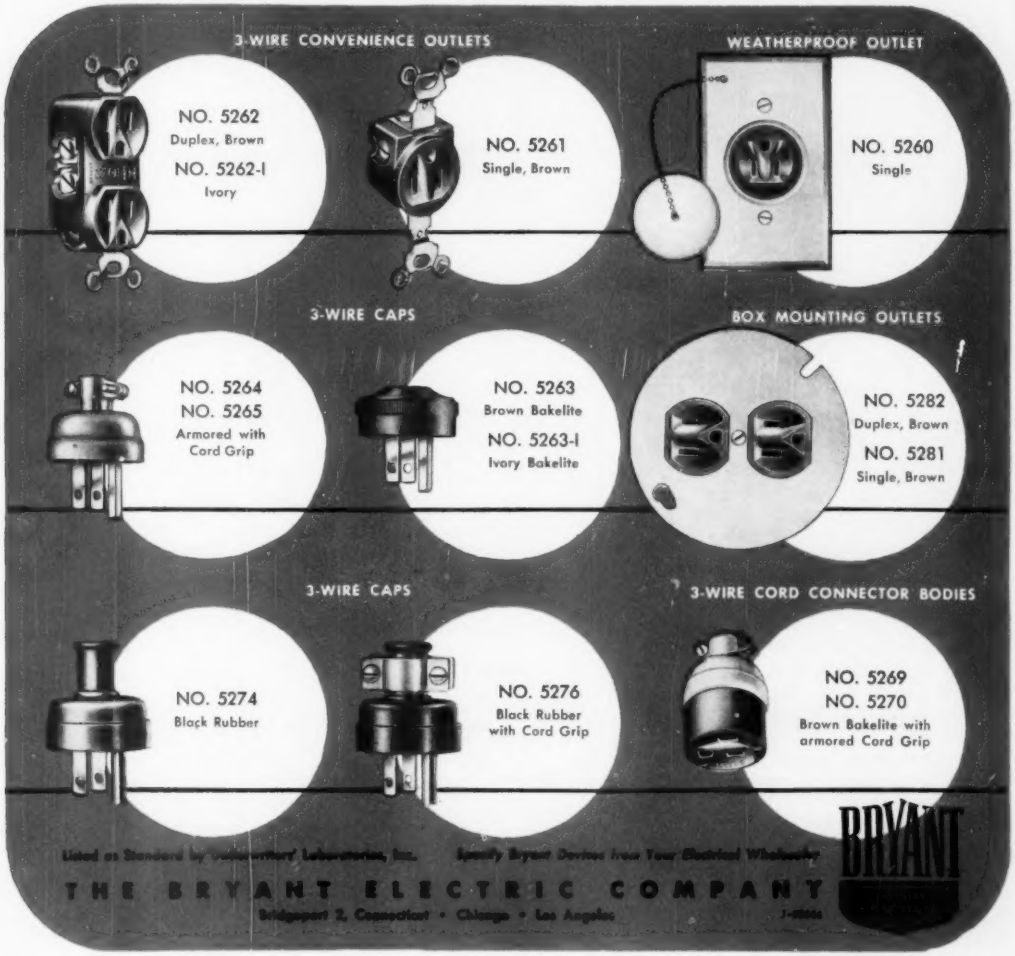
The special design of the grounding prong absolutely prevents its accidental engagement with the live contacts.

The outlets are of all bakelite construction and are provided with washer-type plaster ears and large head terminal binding screws for easy and secure wiring. May be side or back wired. These devices comply with requirements of the National Electrical Code, and their use is being specified for various applications where grounding is desirable.

Duplex outlets are provided with a "break-off" feature permitting devices to be used for two-circuit installations.

When desired, these devices can be used in the conventional manner to accommodate standard 2-pole parallel blade caps.

All Bryant 3-wire grounding devices rated 15 amperes 125 volts.



BUY FROM COMPLETE STOCKS CALL WESCO
FOR QUALITY ELECTRICAL SUPPLIES AND SERVICE

"We Stopped Blows due to excessive Heating in a 600 Ampere Switch...

..BY CHANGING TO FUSETRON DUAL-ELEMENT FUSES"

. . . says W. R. Bishop
Eureka, California

HERE ARE THE FACTS-

"A 600 Ampere 220 volt switch in one of our local schools was causing us a lot of worry. The fuses were running so hot that they were blowing on an average of every 3 or 4 days.

"A salesman told us about the lower resistance of Fusetron dual-element fuses, so we thought we would try them.

"That was more than six weeks ago and not one of the 600 ampere Fusetron fuses has blown. We have checked the switch and find that it is operating at a normal temperature."

W. R. Bishop. Owner
Eureka Wiring Service
Eureka, California

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FOR QUALITY ELECTRICAL SUPPLIES AND SERVICE

You get 10 Point Protection

by changing to Fusetron (DUAL ELEMENT) Fuses

1. * Protect against short-circuits.
2. Protect against needless blows caused by harmless overloads.
3. Protect against needless blows caused by excessive heating — lesser resistance results in much cooler operation.
4. Provide thermal protection — for panels and switches against damage from heating due to poor contact.
5. Protect motors against burnout from overloading.
6. Protect motors against burnout due to single phasing.
7. Give DOUBLE burnout protection to large motors — without extra cost.
8. Make protection of small motors simple and inexpensive.
9. Protect against waste of space and money — permit use of proper size switches and panels.
10. Protect coils, transformers and solenoids against burnout.

* Fusetron Fuses have high interrupting capacity as shown by tests of the Electrical Testing Laboratories of New York City in December 1947.

Here's Why You Get This All-Purpose Protection

The fuse link element opens on short-circuit — the thermal cutout element protects on overloads — the result, a fuse with tremendous time-lag and much less electrical resistance.

They have the same degree of Underwriters' Laboratories approval for both motor-running and circuit protection as the most expensive devices made.

Made to the same dimensions as ordinary fuses — fit all standard fuse holders.

Obtainable in all sizes from 1/10 to 600 ampere, both 250 and 600 volt types. Also in plug types for 125 volt circuits.

There cost is surprisingly low.

(FUSETRON is a trade mark of the Bussmann Mfg. Co., Division of McGraw Electric Co.)

Don't Risk Losses!

One **needless** shutdown . . .
One **lost** motor . . .
One **destroyed** switch or panel
One **burned out** solenoid . . .

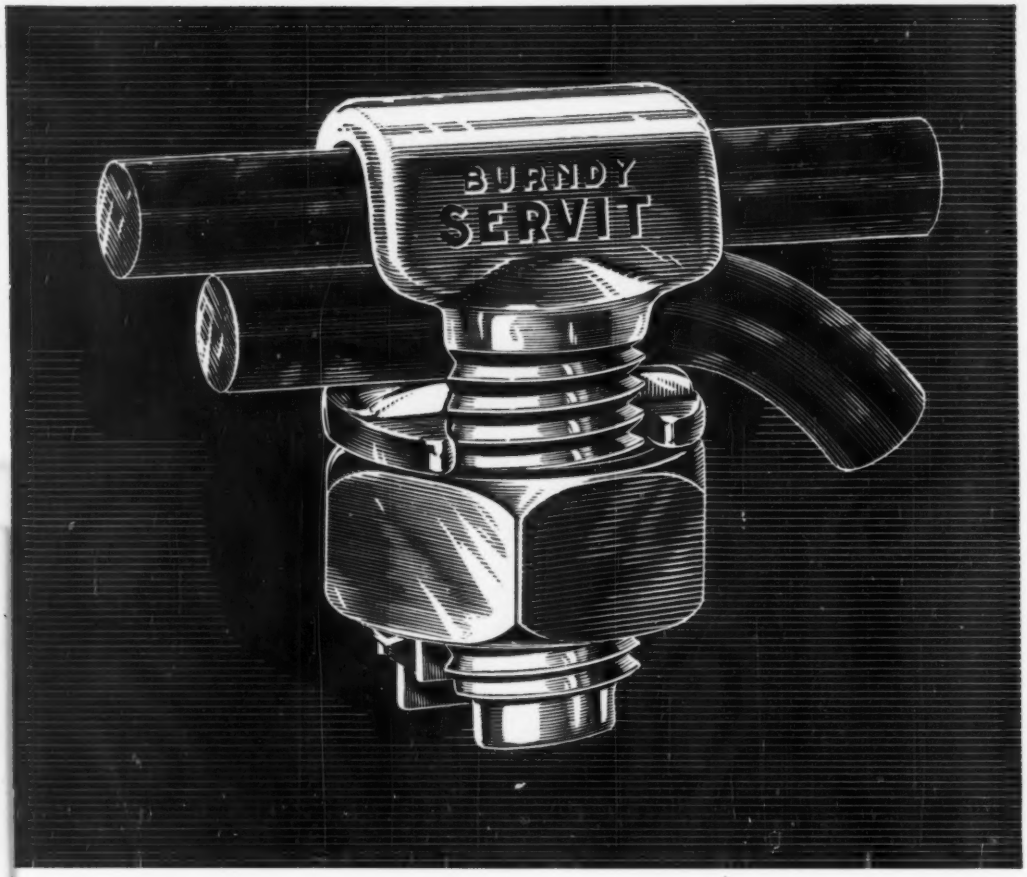
May cost you far more than replacing every ordinary fuse with a Fusetron dual-element Fuse.

MAIL THE COUPON NOW

Bussmann Mfg. Co., University at Jefferson
St. Louis 7, Mo. (Division McGraw Electric Co.)
Please send me complete facts about FUSETRON dual-element Fuses.

*Name*_____
*Title*_____
*Company*_____
*Address*_____
*City & Zone*_____ *State*_____

ECM-11-50



Burndy Servit... universal favorite for taps, dead ends, service entrances, motor leads, junction boxes and ground-wire to neutral connections. Extremely compact, with rounded edges easy to tape. Develops and holds high pressure between conductors. Thirteen sizes accommodate conductors from #10 to 1000 Mcm. Catalog 41 describes SERVIT and other leading Burndy connectors . . Whatever you connect, be sure to . .

Connect with

BURNDY

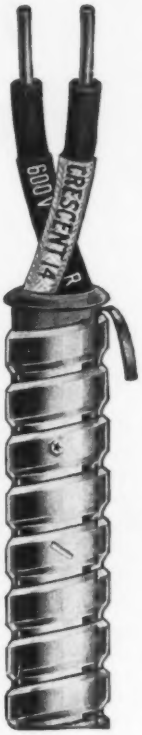
BURNDY, New York 54, N. Y. *Burndy Canada Ltd., Toronto 8, Ontario; Western Branch: Vernon 58, California*

FOR WHAT YOU NEED, WHEN YOU NEED IT—CALL WESCO

CRESCENT

ABC ARMORED CABLE

Has These Improved Features Which Make Installation *EASIER—QUICKER—SAFER*



Bond Strip Under Armor

Permanently low armor resistance **is provided in sizes No. 14 and 12 AWG by use of a flattened, bonding wire which is in contact with the under side of each convolution.**

Prefabricated Break Lines

The Cut Mark (at 1½″ intervals) shows the location of a prefabricated breaking line inside the armor. Only a few strokes of a file or saw guided by the Cut Mark are required to cut through one outer ridge, and a bend by hand severs the armor. This results in a clean separation with no sharp edge—a safer, easier and faster job. The prefabricated breaking lines are so designed that there is *no reduction* in tensile strength, bending quality, crushing resistance and electrical conductivity of armor.

FILE OR SAW

BREAK

PULL OUT PAPER

INSERT BUSHING

The finest product plus WESCO service means satisfaction always.

CRESCENT WIRE & CABLE

CRESCENT INSULATED WIRE & CABLE CO.

TRENTON, N. J.

FOR COURTEOUS, INTELLIGENT SERVICE – CALL WESCO

SUPERIOR PROTECTION

. . . where "TIME-DELAY" is needed most!

With a reputation for Pioneering and Constant Improvement, ECONOMY has always made its Renewable Fuses and Renewal Fuse Links to meet the *maximum* of all requirements of "The Standard for Fuses".

"ECONOMY *Time-Delay*" *Renewal Links*, now offer superior protection where time delay is needed most—within the 135% and 200% range in which most overloads occur.

Because of the simplicity and unusually fine mechanical construction of "ECONOMY Fuses and *Time-Delay*" Renewal Links, renewal is quick and easy.

See your Electrical Wholesaler for the new "ECONOMY *Time-Delay*" Fuses and Links; he has them in stock.

SEND FOR NEW CATALOG

ECONOMY DE-LAY RENEWABLE CARTRIDGE FUSES

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ECONOMY FUSE AND MFG. CO., 2717 GREENVIEW AVE., CHICAGO 14, ILLINOIS REPRESENTATIVES IN ALL PRINCIPAL CITIES

FOR WIDE-AWAKE "INSIDE SERVICE"—CALL WESCO

PROFITS PROD. COSTS

YOU CAN BE **SURE**.. IF IT'S
Westinghouse

How Lee Lime Co. bagged a $12,500 ANNUAL SAVING!

The Lee Lime Company of Lee, Massachusetts, faced a serious outage problem. Actual analysis showed each outage cost $100.00 for lost production, labor cost and machinery breakage. 125 outages per year, due to ordinary fuse safety devices, added up to $12,500. Looking for a way to eliminate this staggering loss, they installed two AB-I Breakers. Result? Complete elimination of 125 outages, and a $12,500 saving was in the bag.

This dollar-saving experience led the Lee Lime Company to install other AB-I Breakers. The group pictured above eliminated one outage per day for an estimated annual saving of $2,600.00.

Savings like these are worth getting. See for yourself the many superior features AB-I Breakers have over ordinary protective devices. AB-I Breakers permit harmless overloads, but trip instantly when a dangerous overload occurs. And remember, there are no fuses to replace, no delays in restoring service. The workman can restore service immediately without danger or exposure to live parts.

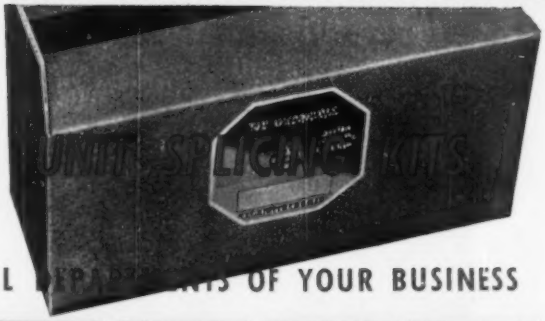
Get all the money-saving facts. Contact your nearby Westinghouse representative or write for Bulletin DB-30-230, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-30029

Westinghouse
AB-I BREAKERS

FOR DELIVERIES TO MEET WORK SCHEDULES—CALL WESCO

Here are the REASONS WHY

G & W



G & W unit splicing kits can save you time, labor, trouble and money by simplifying the task of designing cable joints, ordering and storing materials, and installing cable splices.

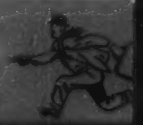
BENEFIT ALL DEPARTMENTS OF YOUR BUSINESS

	ENGINEERING	PURCHASING	STOREKEEPING	INSTALLATION	MANAGEMENT
First quality materials assured by rigid factory standards and inspection. Lengthy material specifications and inspection of goods unnecessary.	SAVE Time and Labor	SAVE Time and Labor	SAVE Time and Labor		SAVE Headaches
Both design and installation methods can be standardized for all joints for each type of cable.	SAVE Time and Labor		SAVE Time and Labor	SAVE Time and Labor	SAVE Money
All joints properly designed to industry standards by expert cable engineers.	SAVE Time and Labor			SAVE Time and Labor	SAVE Headaches
Correct quantities of materials furnished for each individual joint. Eliminates excess waste.	SAVE Time and Labor	SAVE Time and Labor	SAVE Time and Labor	SAVE Time and Labor	SAVE Money
All splicing materials are purchased from one source. You buy with one order—receive one invoice—pay one bill.		SAVE Time and Labor	SAVE Time and Labor		SAVE Money
Each kit packed in convenient size box. Easy to store, identify and handle. Material kept clean and ready for use.			SAVE Time and Labor	SAVE Time and Labor	SAVE Headaches
Individual kits issued directly to workmen in original shipping cartons. Eliminates handling problems.			SAVE Time and Labor	SAVE Time and Labor	SAVE Money
Easy to estimate costs for any particular job. Each kit priced separately. Buy only what you need for each job.	SAVE Time and Labor	SAVE Time and Labor	SAVE Space		SAVE Time
Material readily available for immediate installation in emergencies. No shortage of material on the job. Quick delivery from stock.		SAVE Time and Labor	SAVE Time and Labor	SAVE Time and Labor	SAVE Headaches
Inventories can be lowered by stocking minimum supply of kits. No excess bulk material needed.		SAVE Time and Labor	SAVE Space		SAVE Money

Send for your copy of G & W Bulletin J50—Unit Splicing Kits for all High Voltage Cables.

G & W ELECTRIC SPECIALTY COMPANY.
7780 DANTE AVENUE • CHICAGO 19, ILLINOIS, U.S.A.
Representatives in principal cities. In Canada, Powerlite Devices, Ltd., Toronto

YOU NAME IT; WESCO HAS IT OR CAN GET IT



TRUST...WELL PLACED

IN PROCUREMENT... Two fundamentals apply, always. 1. Pick yourself a reliable source of supply. 2. Specify a definite manufacturer's product, for quality's sake...This page displays two names to which you can pin your faith, under all circumstances. Everything you need is there—modern-specification insulation; quality-guaranteed construction; intelligent, cooperative service—"MORE POWER TO YOU".

- BARE WIRES AND CABLES
- OK*—PEERLESS*—TIP-TOP* WEATHERPROOF WIRES
- GUARDIAN* BUILDING WIRES AND CABLES—THERMOPLASTIC AND RUBBER INSULATED
- ROMEX* AND ROMEX-T. NON-METALLIC SHEATHED CABLES
- VARNISHED CAMBRIC POWER AND CONTROL CABLES, THERMOPLASTIC AND THERMOSETTING JACKETED, BRAIDED, OR LEAD SHEATHED
- ASBESTOS AND ASBESTOS VARNISHED CAMBRIC WIRES AND CABLES
- SUPER SERVICE S* AND OTHER PORTABLE CORDS AND CABLES

*TRADE MARK REG. U.S. PAT. OFF.

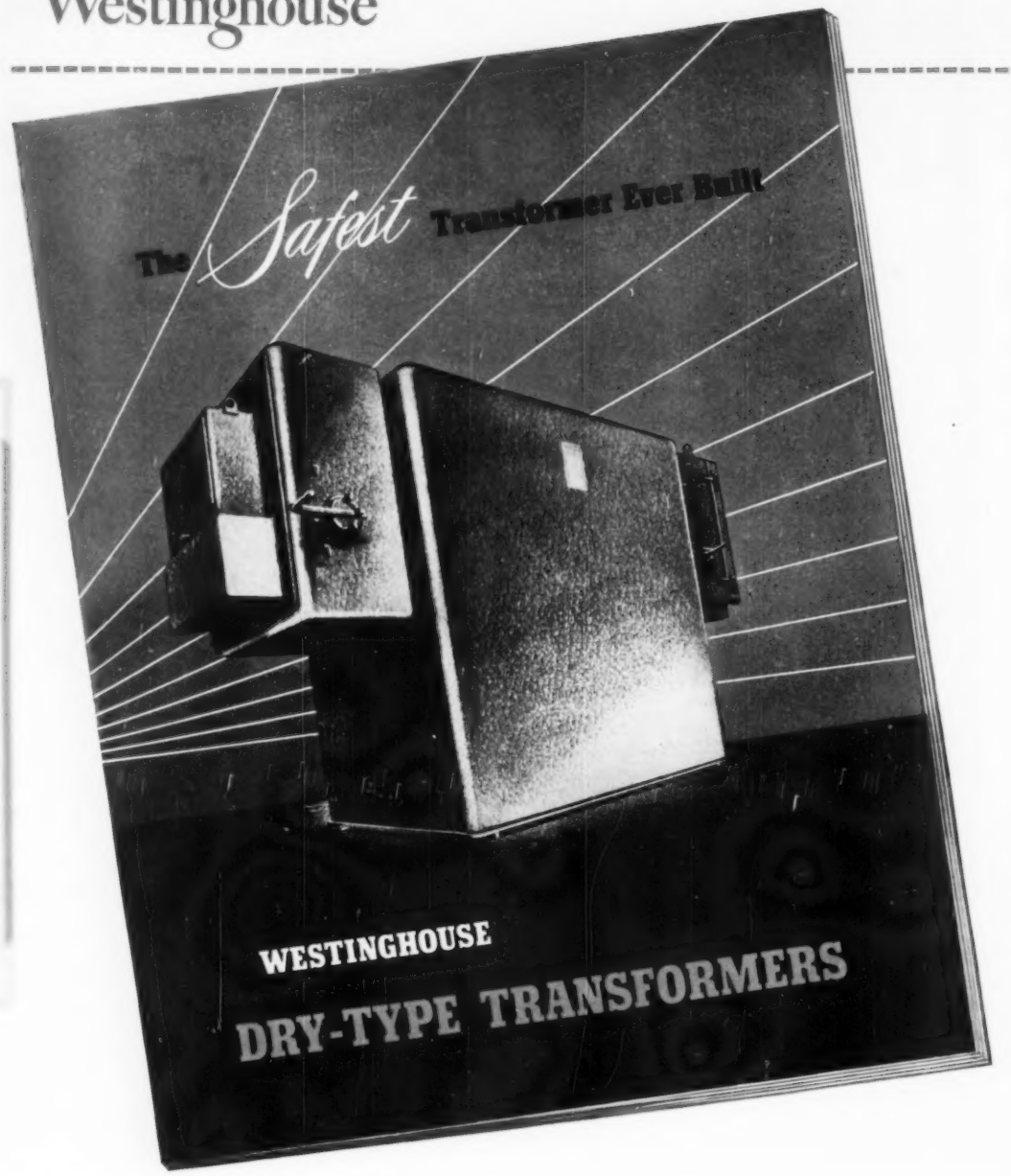
GENERAL CABLE
CORPORATION

OFFICES IN PRINCIPAL CITIES

USE THE EXPERIENCE OF TRAINED WESCO MEN

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



TO HELP YOU ON THE JOB CALL WESCO
FOR QUALITY ELECTRICAL SUPPLIES AND SERVICE

New Booklet!

Tells where and how Dry-Type Transformers can provide greater safety . . . save money . . . do a better job for you

It's just off the press. "The Safest Transformer Ever Built" is a fully illustrated booklet on Westinghouse Dry-Type Transformers.

The booklet's 24 pages show the many typical applications of the Dry-Type Transformer and the various sizes, ratings and types available to fill your requirements. Examples clearly illustrate the savings possible on installation, maintenance and power costs.

This new booklet is *free* to you. Get your copy now from your Westinghouse representative or write for booklet B-4428, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-70574

Westinghouse

DRY-TYPE TRANSFORMERS

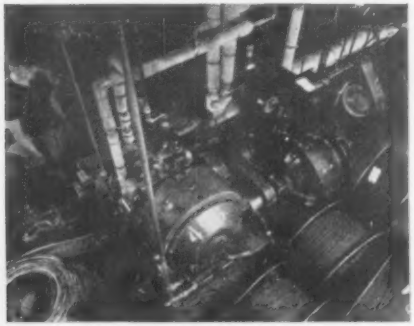
WESTINGHOUSE

BUY FROM COMPLETE STOCKS CALL WESCO

FOR QUALITY ELECTRICAL SUPPLIES AND SERVICE

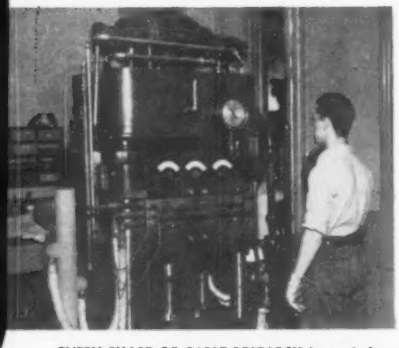
RESEARCH AND TESTING...

EVERY RAW MATERIAL received at Hazard's plant must first pass rigid laboratory tests before release to production.



EVERY STEP IN MANUFACTURE is carefully controlled by sensitive gauges and instruments that assure product uniformity.

EVERY COMPLETED WIRE OR CABLE before shipment must stand up under an electrical pressure test far in excess of what would be expected in normal service.



EVERY PHASE OF CABLE RESEARCH is carried on year in and year out by highly trained and experienced technicians in Hazard's modern research laboratories.

backbone of HAZARD wire and cable performance

You're always sure of long, trouble-free, economical service with Hazard wires and cables for two very sound reasons.

First, Hazard research. Year after year, an extensive program of laboratory and field research is carried on to develop ever better cable designs. Close coordination and exchange of information is carried on with the Okonite research program as well. When you select a Hazard wire or cable, you know you're getting the most modern in proved cable design and materials.

Second, Hazard testing. A cable can be no better than the quality of the materials used in its manufacture. Careful, thorough testing of all raw materials is routine. Manufacturing processes are carefully controlled and checked to high standards of uniformity. Finally the finished wire or cable itself is thoroughly tested and must meet rigid standards that protect Hazard's reputation.

This solid foundation on which Hazard quality is built explains why such outstanding records of performance are turned in by Hazard wires and cables in actual service. For example, in all the millions of feet of Hazasheath underground cable that have been installed since it was introduced not a single failure due to inherent defects in the insulation or sheath has been reported. *That's performance.* Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZARD insulated wires and cables for every electrical use

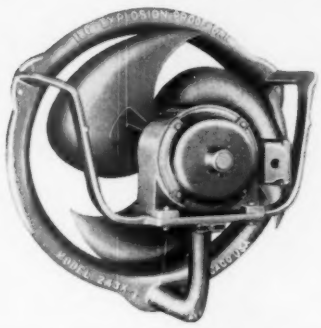
8683

FOR COMPETITIVE PRICES CALL WESCO
FOR QUALITY ELECTRICAL SUPPLIES AND SERVICE

Three new ILG products

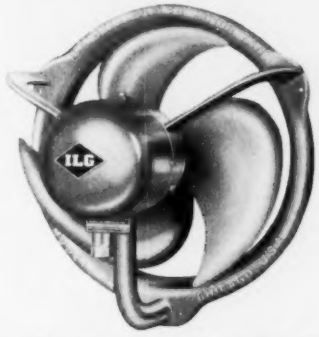
to help you solve ventilating problems

1 TYPE "X" EXPLOSION-PROOF PROPELLER FANS

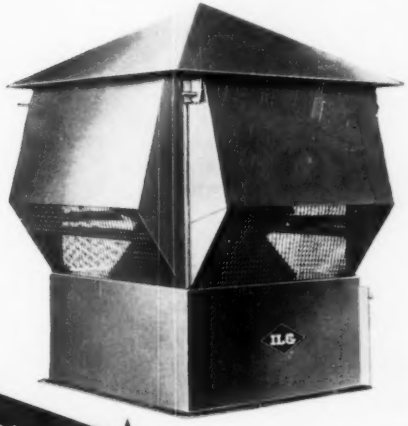


Ball bearing, explosion-proof motor carries Underwriters' Laboratories label, suitable for all Class 1, Group D hazardous applications. Nonferrous frame and Type "Q" fan wheel. 16 capacities. Bulletin No. 148X2.

2 TYPE "P" HIGH SPEED PROPELLER FANS



Designed to move *maximum* air volume, with *minimum* physical dimensions, for industrial and commercial applications. 4 sizes. Type "P" line supplements ILG standard propeller fans which are available in many sizes with capacities from 250 to 40,500 CFM, each equipped with the famous ILG Self-Cooled Motor. Bulletin No. 148P1.



3 MODEL "PRV" POWER ROOF VENTILATORS

(Centrifugal Fan Type)

ILG-designed, ILG-built for efficient, trouble-free exhaust from vertical flues in multi-story buildings or from duct systems. Ten sizes to operate against resistances from ¼" to 1½". BC type load-limiting centrifugal fan wheel with space-saving direct-drive. Vertical type ball-bearing motor of proven ILG design. Weather-proof housing . . . leakproof construction. Easily installed . . . wired . . . serviced. ILG "One-Name-Plate" Responsibility covers entire unit including motor. Bulletin No. S-311.

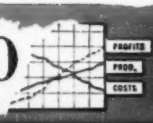
Data, Prices!

For new bulletins and prices, phone nearby Branch Office or write us today.
ILG ELECTRIC VENTILATING CO., 2879 North Crawford Avenue, Chicago 41, Illinois
Offices in more than 40 Principal Cities.

It's *Easier* to work in *Every Way*

It's easy to work in close quarters with ELECTRUNITE *E.M.T. No turning of long or bent tubing lengths—just tighten the strong compression fittings with wrench or heavy-duty pliers.*

FOR WHAT YOU NEED, WHEN YOU NEED IT—CALL WESCO



with ELECTRUNITE E.M.T.

Yes, wiring installations are easier in every way, in every place, with Republic's famous ELECTRUNITE E.M.T. This lightweight *modern* rigid steel raceway takes the hard work and trouble out of handling, cutting, bending, coupling, wire pulling . . . takes the backaches and "headaches" out of installation in cramped hard-to-reach locations, in vertical runways, in narrow concrete pan openings.

This ease of installation alone makes ELECTRUNITE E.M.T. a wiringman's best buy. For, as every electrician knows, easy installation makes for a perfect wiring job *at a profit!*

ELECTRUNITE E.M.T. is dependable, safe-for-a-lifetime wiring protection—approved by the National Electrical Code for exposed, concealed and concrete slab construction.

Why not get all the facts about Republic ELECTRUNITE E.M.T.? Check into all its advantages and learn how it will help you hold costs down. Your ELECTRUNITE Distributor will gladly give you complete information or you can write to—

ELECTRUNITE E. M. T. — *AND ONLY* ELECTRUNITE E. M. T. GIVES YOU *ALL 5* OF THESE EASY-TO-INSTALL FEATURES

1. ***Inch-Marking***—Easy-to-read inch and foot marks imprinted on every length of ELECTRUNITE E.M.T. in most popular sizes for easier measurement of bending and cutting distances.
2. ***Light Weight***—Weighing less than half as much as heavy conduit, ELECTRUNITE E.M.T. is easier to carry, easier to handle and easier to install.
3. ***No Thread-Cutting***—Modern compression fittings eliminate need for threads . . . make strong, concrete- and spray-tight joints in a matter of seconds.
4. ***Knurled Inside Surface***—Actual tests prove that ELECTRUNITE's patented inner surface makes wire-pulling as much as 30% easier.
5. ***Bending System***—A combination of Inch-Marking, patented one-piece ELECTRUNITE Bender and Instruction Tag . . . simplifies all types of bends, stubs and offsets.

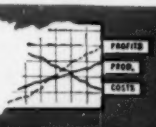
REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION • • CLEVELAND 8, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

REPUBLIC STEEL

Republic ELECTRUNITE E.M.T.

LIGHTWEIGHT THREADLESS RIGID STEEL RACEWAY

FOR COURTEOUS, INTELLIGENT SERVICE—CALL WESCO



IDEAL Wire-Nuts®

THE SOLDERLESS, TAPELESS, WIRE CONNECTORS
Patented — No. 1,933,555

Now Fully Approved

FOR ALL TYPES OF BRANCH CIRCUIT WIRING

Contractors' Sizes 74B and 76B Now Listed by UNDERWRITERS' as PRESSURE CABLE CONNECTORS (General Use)

This new approval means that IDEAL "Wire-Nuts" (Sizes 74B and 76B) can now be used for all types of branch circuit wiring . . . conduit . . . armored cable . . . non-metallic sheathed cable and open wiring. Improved materials and manufacturing methods make possible this broader approval.

IDEAL built an entire new plant devoted exclusively to the production of "Wire-Nuts". It developed and put into use even more rigid inspection and testing methods—still higher precision control standards.

Today, to a greater degree than ever before, IDEAL "Wire-Nuts" are the safest, surest way to make fully approved wire joints. Far easier, too—just screw them on, like a nut on a bolt—no solder, tape or cumbersome tools! *And, "Wire-Nuts" cut wiring costs!* But, make sure you get *genuine* IDEAL "Wire-Nuts" — the screw-on connector listed by Underwriters' Laboratories, Inc. for circuit wiring. Order from your IDEAL Distributor today!

IDEAL INDUSTRIES, Inc.
Sycamore, Illinois

New IDEAL Set Screw WIRE CONNECTOR

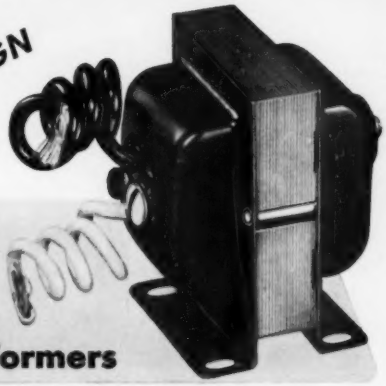
Approved for 600 Volts as Pressure Cable Connectors for General Use

IDEAL quality for those who prefer a set screw type connector.
Permits visual inspection of joint and examination at any time! Extra long skirt—extra strong—high dielectric. No solder, tape or special tools needed. For all common wire combinations.

FOR WIDE-AWAKE "INSIDE SERVICE"—CALL WESCO

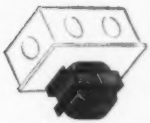
ALL TYPES OF INSTALLATIONS

A TRULY UNIVERSAL DESIGN

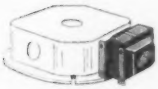


Jefferson Bell and Chime Transformers

Attached to round outlet box cover.



Attached to square outlet box cover.



Mounted on side of round or square outlet box.

Mounted to wall of fuse or switch cabinet.

Ready to mount wherever there is a knock-out, both the Jefferson Bell and Chime Transformers are designed for quick attachment to (1) round or square outlet box cover, (2) side of outlet box, or (3) to wall of fuse or switch cabinet.

Mounting feet are also provided for open wiring installation on post, wall, or ceiling. Either the Bell or Chime Transformer is easy to install, having a lip and set-screw for clamping to edge of the knock-out of metal cover, box, or cabinet with primary leads for connecting to circuit and terminals for bell wires.

FOR BELLS: The Jefferson "Wizard" Bell Transformer has a capacity of 5 watts with 115V primary and 10V secondary; furnished with secondary binding posts.

FOR CHIMES: The Jefferson Universal Chime Transformer has a rating of 10 V.A. and is furnished with 12 and 18 volt taps. There are two types; one available with secondary leads, the other with secondary binding posts.

Reduce Stock... Increase Turnover

The unusual, practical design of these two types of Jefferson Transformers makes it possible to keep stock at a minimum while increasing turnover. Write for further details today.

JEFFERSON ELECTRIC COMPANY
Bellwood, Illinois
In Canada: Canadian Jefferson Electric Co., Ltd.
384 Pape Ave., Toronto, Ont.

Approved by Underwriters' Laboratories.

Folder 474-BT Sent Upon Request

JEFFERSON'S 35TH YEAR

JAMES M. BENNAN
President
Jefferson Electric Co.

A business like a man at the 35th milestone is full of vigor and stamina,—well set for bigger things. Mr. James M. Bennan, president of Jefferson Electric Company, says, "We look upon our future growth so confidently because during our first 35 years we have developed the essential engineering, research, manufacturing technique and control. We can put this long experience to good use to assure continued uniform high quality in quantity production."

Electrical Wholesaler Cooperation Greatly Appreciated

The customers of Wholesalers are well acquainted with such Jefferson products as:

- Saf-T-Lag Thermal Fuses
- Union Renewable Fuses
- Union Indicating Fuses
- Gem Non-Indicating Fuses
- Super-Lag Renewable Fuses
- Plug Fuses
- Fustats
- Bell and Chime Transformers
- Dry Type Power Circuit Transformers
- Ballasts, Fluorescent and Slimline
- Ignition Transformers
- Neon Transformers

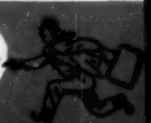
Jefferson Long-Life Power Circuit Transformers

Jefferson acknowledges the years of cooperation of so many of its Electrical Wholesaler friends and it goes without saying that our Wholesaler policy will be maintained in the future as in the past.

TRANSFORMERS

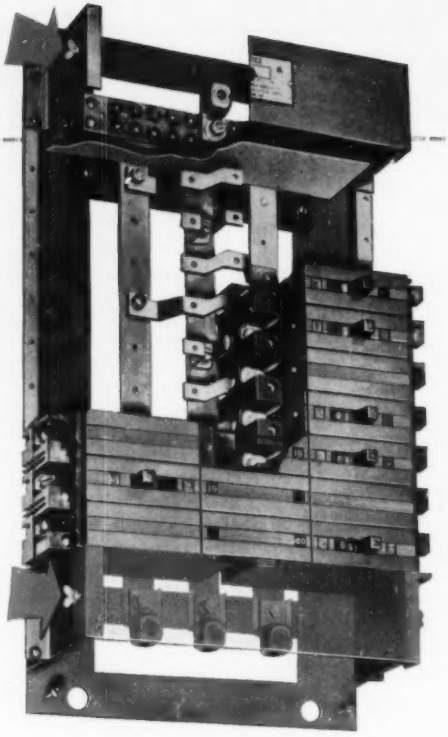
JEFFERSON ELECTRIC COMPANY

FOR DELIVERIES TO MEET WORK SCHEDULES—CALL WESCO



YOU CAN BE **SURE**.. IF IT'S

Westinghouse



FAST INSTALLATIONS CUT JOB COSTS

cut panelboard assembly time . . . with "QUICK ACCESS PLATES!"

Twist just two wing bolts, and access cover can be secured or removed!

This little feature is typical of many that enables you to install Westinghouse Lighting Panelboards fast! There's nothing to remove . . . No need to worry about replacing odd-sized machine screws that may be lost. And minutes saved here, plus time gained as a result of other Westinghouse features, add up to substantial savings. For example, consider the effect of these design "extras" on panelboard installation costs.

Indicating trim clamps... to speed installation of the "cabinet front".

Sequence phasing...to cut "ring-out" time for 3-phase, 4-wire lighting panelboards.

It's little things like these that effect big cuts in final panelboard costs . . . that enable you to buy quality-constructed panelboards for less. So, next time, specify the best! Specify Westinghouse Panelboards. It's the *sure* way to slash job costs.

Descriptive Bulletin 30-930 contains complete information. For your copy, write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-40386

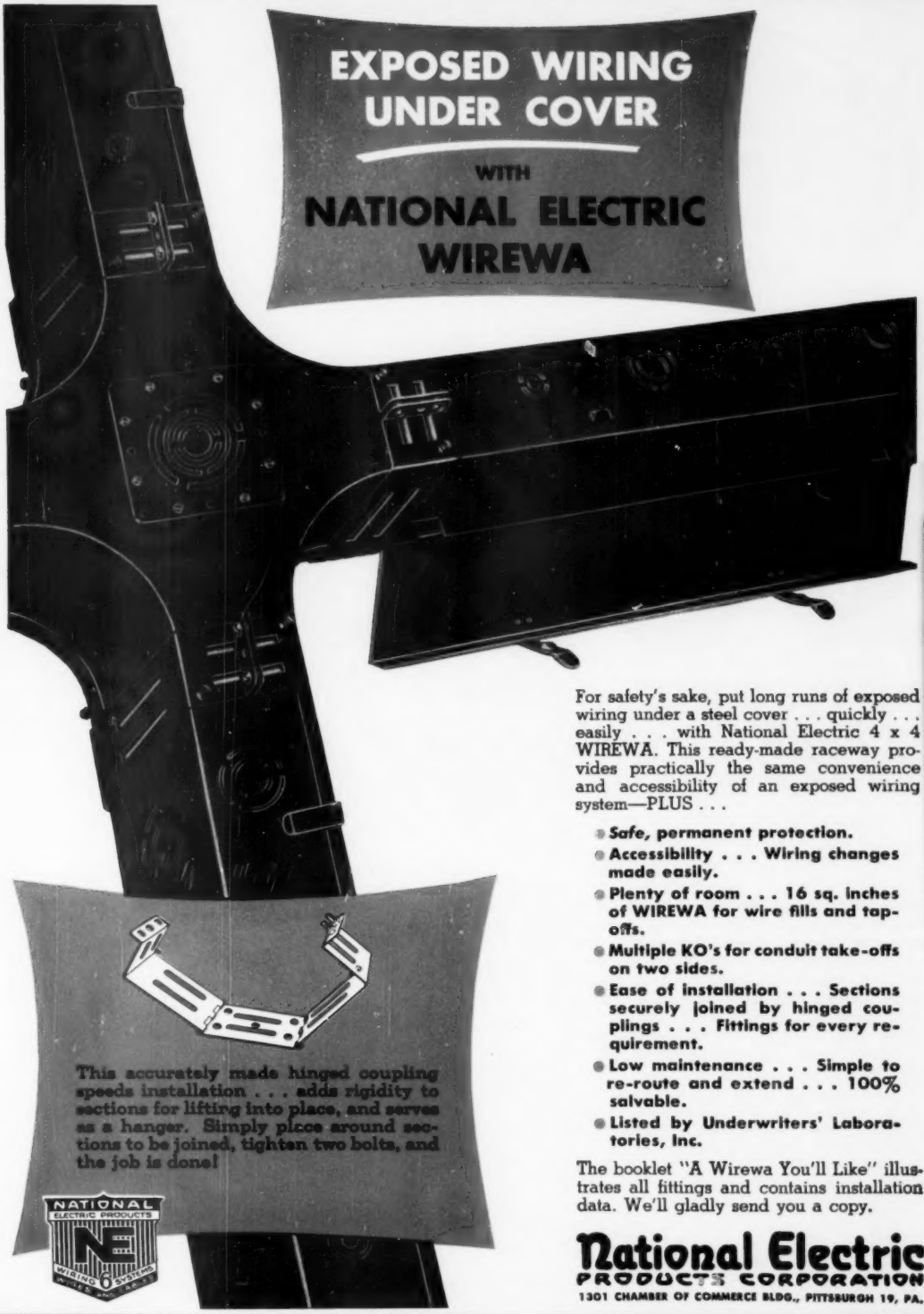
Westinghouse PANELBOARDS

YOU NAME IT; WESCO HAS IT OR CAN GET IT

EXPOSED WIRING UNDER COVER

WITH

NATIONAL ELECTRIC WIREWA



This accurately made hinged coupling speeds installation . . . adds rigidity to sections for lifting into place, and serves as a hanger. Simply piece around sections to be joined, tighten two bolts, and the job is done!

For safety's sake, put long runs of exposed wiring under a steel cover . . . quickly . . . easily . . . with National Electric 4 x 4 WIREWA. This ready-made raceway provides practically the same convenience and accessibility of an exposed wiring system—PLUS . . .

- ***Safe*, permanent protection.**
- **Accessibility . . . Wiring changes made easily.**
- **Plenty of room . . . 16 sq. inches of WIREWA for wire fills and tap-offs.**
- **Multiple KO's for conduit take-offs on two sides.**
- **Ease of installation . . . Sections securely joined by hinged couplings . . . Fittings for every requirement.**
- **Low maintenance . . . Simple to re-route and extend . . . 100% salvable.**
- **Listed by Underwriters' Laboratories, Inc.**

The booklet "A Wirewa You'll Like" illustrates all fittings and contains installation data. We'll gladly send you a copy.

National Electric
PRODUCTS CORPORATION
1301 CHAMBER OF COMMERCE BLDG., PITTSBURGH 19, PA.

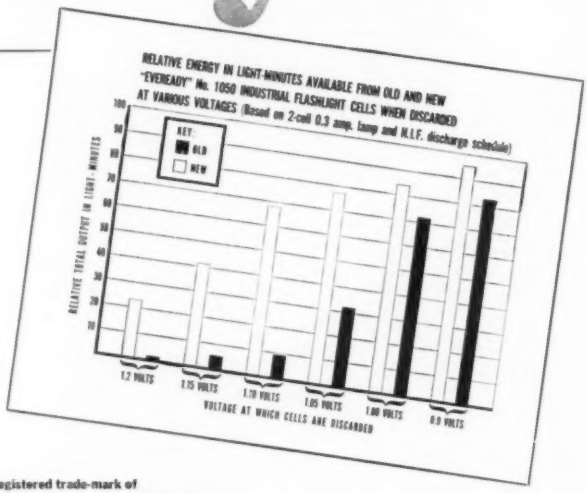
USE THE EXPERIENCE OF TRAINED WESCO MEN

It's the NEW "Eveready" No. 1050 Flashlight Battery!

More than DOUBLE the Usable Light!

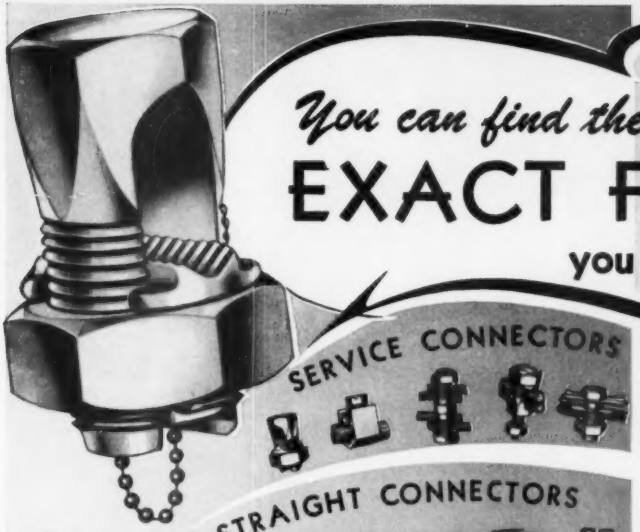
Here is the biggest news since flashlights were invented. It is a flashlight battery of completely new and different design. A battery so potent that it delivers more than twice as much usable, brilliant white light for critical uses than any other flashlight battery National Carbon has ever made. In addition, it also provides more light-energy output to the lower cut-off points. It is the new and improved "Eveready" No. 1050 flashlight battery.

This battery has no "metal can" to leak or corrode. It will not swell, stick or jam in the flashlight. Try these new batteries in your industrial and safety flashlights. Compare them with the batteries you have been using. See for yourself how much better they are . . . how much more economical to use.



The term "Eveready" is a registered trade-mark of
NATIONAL CARBON DIVISION • UNION CARBIDE AND CARBON CORPORATION
30 East 42nd Street, New York 17, N. Y.
DISTRICT SALES OFFICES: Atlanta • Chicago • Dallas • Kansas City • New York • Pittsburgh • San Francisco

TO HELP YOU ON THE JOB CALL WESCO
FOR QUALITY ELECTRICAL SUPPLIES AND SERVICE



You can find the

EXACT FITTING

you need — in the

SERVICE CONNECTORS

STRAIGHT CONNECTORS

TEES

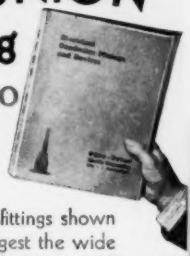
LUGS

GROUNDING CONNECTORS

and MANY MORE

PENN-UNION Catalog

at any WESCO Branch



The conductor fittings shown here can only suggest the wide variety. You'll find practically every good type, in a complete range of sizes.

New connectors are constantly being added - - so when you need a special fitting for an unusual service, tell us about it. Most likely we have exactly what you want.

Better design is a Penn-Union feature that you'll appreciate. For example, note the large gripping surfaces for wrenches, on the service connector shown in the upper left corner. When you use any Penn-Union fitting, you are sure that it is dependable - - mechanically and electrically.

The most important items are Listed by Underwriters Laboratories

Preferred by Leading Users, who have found that the "Penn-Union" mark on a connector is their best guarantee of unfailing service.

Stocked by Wesco Branches

PENN-UNION ELECTRIC CORP.
ERIE, PA.

The COMPLETE Line of Conductor Fittings

PENN-UNION

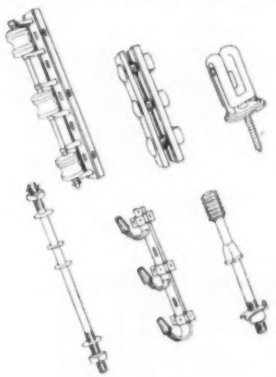
BUY FROM COMPLETE STOCKS **CALL WESCO**

FOR QUALITY ELECTRICAL SUPPLIES AND SERVICE

OLIVER
POLE LINE MATERIALS

For Industrial, Commercial and Domestic Service

A FEW ITEMS
FROM THIS COMPLETE **OLIVER** LINE



For a lifetime of dependable service, specify OLIVER Pole Line Materials. All the items you need, in sizes and types to meet your requirements are found in the complete Oliver line. A few of the most popular items are shown at the left.

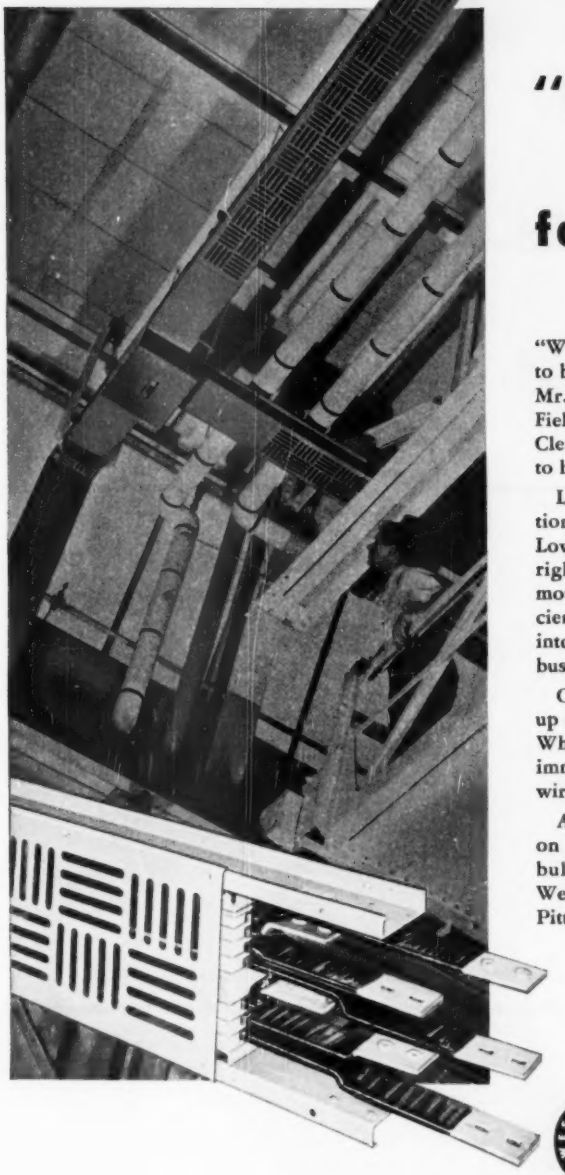
To insure the high quality and dependability that means satisfactory service—specify OLIVER!

OLIVER
IRON AND STEEL
CORPORATION
South Tenth and Muriel Sts. · Pittsburgh 3, Pa.

FOR COMPETITIVE PRICES CALL WESCO
FOR QUALITY ELECTRICAL SUPPLIES AND SERVICE

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



"Low Impedance BUS DUCT for the Long Run"

"We've found Westinghouse low impedance bus duct to be ideal for long transmission runs in a plant," say Mr. R.W. Holicky, Chief Engineer, and Mr. W. F. Nock, Field Supervisor, of the Doan Electric Company in Cleveland. "It's easy to handle and no trouble at all to hook up."

Let bus duct answer *your* secondary power distribution problems—whether you're building or expanding. Low impedance bus duct provides required voltage right out to the end of your system . . . keeps lights, motors, and other equipment functioning at top efficiency. In addition, it packs greater carrying capacity into a smaller space than either conduit or wire. And bus duct means reduced maintenance.

Completely pre-fabricated sections can be installed up out of the way of plant traffic—quickly and easily. What's more, the sections can be disassembled immediately and rushed to new locations with no wiring mess to unravel.

Ask your Westinghouse representative for the facts on dollar and space-saving bus duct. Descriptive bulletin B-4271 contains further information. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-30042

Westinghouse

BUS DUCT

O.Z. ELECTRICAL MANUFACTURING CO.

262 BOND STREET, BROOKLYN 2, N. Y.

Representatives in all Principal Cities

They're O.K. if They're O.Z.

CONDUIT FITTINGS • CABLE TERMINATORS
CAST IRON BOXES • POWER CONNECTORS
SOLDERLESS CONNECTORS
GROUNDING DEVICES

CABLE SUPPORTS
CONDUIT TYPE

CABLE SUPPORTS
SPLIT TYPE

CONDUIT FITTINGS

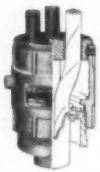
INSULATED
BUSHINGS

BAKELITE
BUSHINGS

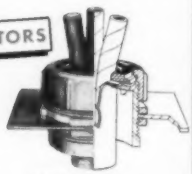
SPLIT
COUPLINGS

EXPANSION
FITTINGS

CABLE TERMINATORS



TERMINATING
POTHEADS



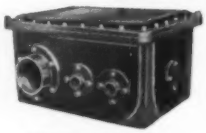
SEALING
BUSHINGS

COMBINATION
LUGS

COMBINATION
TWO-WAY
CONNECTORS

SOLDERLESS CONNECTORS

CAST IRON BOXES



EXPLOSION PROOF
TYPE

WEATHER PROOF
TYPE

COMBINATION
TEE AND
PARRELLEL CONNECTORS

GROUND
CONNECTORS

POWER CONNECTORS

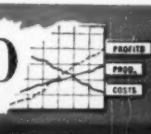
T-CONNECTORS, TUBE
TO MULTIPLE CABLE TYPE

BUS BAR
CLAMPS

Improved and expanded, the O.Z. line of electrical fittings meets all engineering and design needs. Solderless Connectors, Cast Iron Boxes, Conduit Fittings, Cable Terminators, Power Connectors, Grounding Devices in all sizes are supplied. Special fittings made to individual specifications.

Write for O.Z. Calalog containing complete information on over 160 items.

FOR WHAT YOU NEED, WHEN YOU NEED IT—CALL WESCO



Choose the Time Switch you need from this *Complete* Line

Specify SANGAMO *for Assured Performance*

"Precision in Miniature"

Type S Time Switch
Single Pole
Single Throw

Type TJ
Plug-in Type
Interval Timer

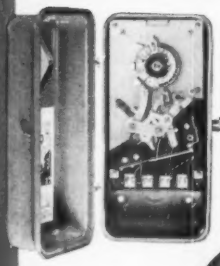
Heavy-Duty Switches

Type L
Synchronous

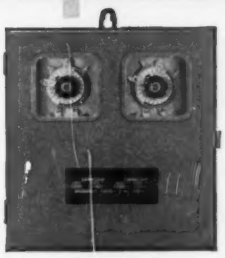
Type W
Synchronous-carryover

Astronomic Dial

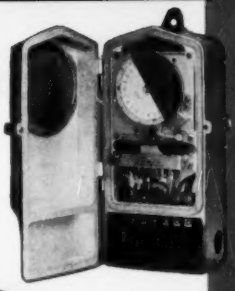
Special Duty Time Switches



Type LY
Two-Circuit

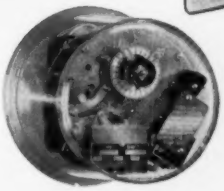


Type LD
Duplex



Type TC
Electrically-wound

Type MA
Synchronous



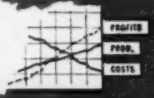
Type WS
Synchronous-carryover

SANGAMO

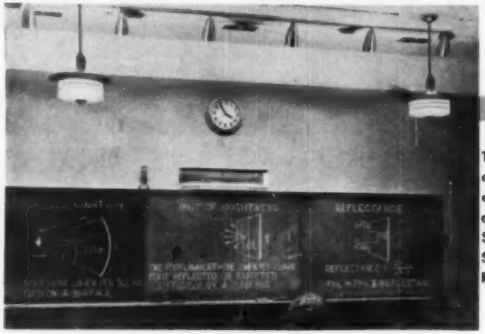
SANGAMO ELECTRIC COMPANY

SPRINGFIELD · ILLINOIS

FOR COURTEOUS, INTELLIGENT SERVICE – CALL WESCO

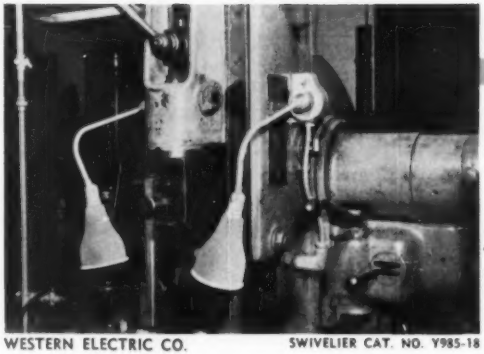


SWIVELIER Lighting Fixtures
Adjustability At Its Best!



SWIVELIER FOR BLACKBOARD LIGHTING

The Minneapolis Board of Education after consulting with nine (9) lighting engineers, Public Utility Lighting Experts and conducting extensive tests, specified SWIVELIER adjustable fixtures for use on Standard Raceways for ALL blackboard Relighting jobs in Minneapolis.



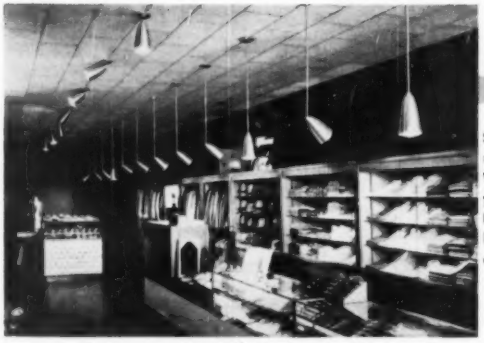
WESTERN ELECTRIC CO. SWIVELIER CAT. NO. Y985-18

SWIVELIER FOR INDUSTRIAL LIGHTING

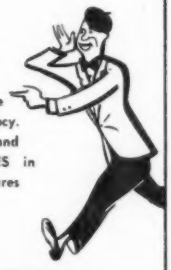
SWIVELIER "Worklites" are specified by Leading Manufacturers. Unaffected by Vibration, Will Not Work Loose regardless of number of adjustments. "Puts Light on the Spot!" D. O. (Defence Program.)

Call on SWIVELIER "know how" Engineering Skill and Production Facilities for the answers to your "Spot Lighting" problems. Tens of Thousands of SWIVELIER products were used by the Air Corps and Defence Plants during World War II. Thousands are being specified today.

OFFICIAL U. S. AIR FORCE TESTS SHOW "NO DECREASE IN TENSION AFTER 10,000 ADJUSTMENTS."



SWIVELIER FOR STORE and DISPLAY LIGHTING

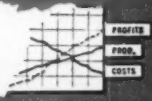


SWIVELIER products are designed for the maximum in lighting flexibility and efficiency. Walk down Main Street the world over and you'll find SWIVELIER LIGHTING FIXTURES in Better Stores Everywhere. SWIVELIER fixtures have stood the test of time with its high and consistent standard of quality.

LOOK FOR THE **swivelier** TRADE-MARK ON EVERY SWIVELIER FIXTURE!

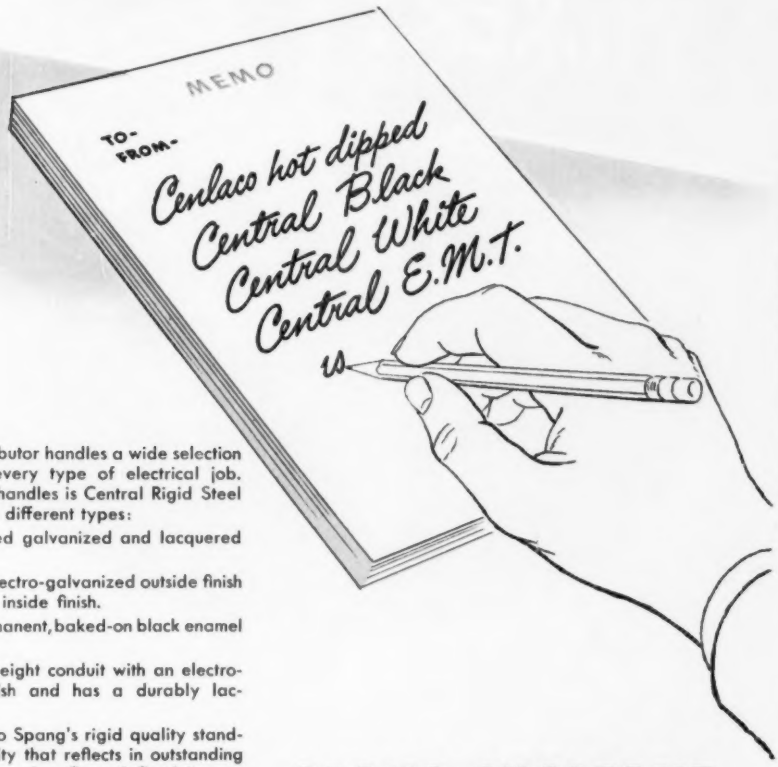
SWIVELIER COMPANY, Inc., 30 Irving Place, New York 3, N. Y.

FOR WIDE-AWAKE "INSIDE SERVICE"—CALL WESCO



YOU NAME IT...

...YOUR CENTRAL CONDUIT DISTRIBUTOR HANDLES IT



Your Central Conduit Distributor handles a wide selection of quality products for every type of electrical job. Among the many lines he handles is Central Rigid Steel Conduit that comes in four different types:

Cenlaco has a hot dipped galvanized and lacquered finish.

Central White has an electro-galvanized outside finish and a black enameled inside finish.

Central Black has a permanent, baked-on black enamel finish inside and out.

Central EMT is a light-weight conduit with an electro-galvanized outside finish and has a durably lacquered inside finish.

All four types are made to Spang's rigid quality standards. It's the kind of quality that reflects in outstanding product performance . . . makes Central Conduit easy to cut, bend and thread . . . standards that help you save time on the job.

When you need conduit or other electrical supplies, call your Central Conduit Distributor. In spite of the great demand, he'll do everything in his power to fill your order as quickly as possible.

SPANG-CHALFANT

Division of The National Supply Company
General Sales Office: Grant Bldg., Pittsburgh, Pa.
District Offices and Sales Representatives in Principal Cities

CENLACO a hot dipped galvanized and lacquered finish, inside and out.

CENTRAL WHITE electro-galvanized outside and black enameled inside.

CENTRAL BLACK permanent, baked-on black enamel finish, inside and out.

EMT—Light-weight electro-galvanized outside and durably lacquered inside.

FOR DELIVERIES TO MEET WORK SCHEDULES—CALL WESCO

YOU CAN BE **SURE**.. IF IT'S
Westinghouse

Don't be a FIXTURE PICKER!

They'll never find a "bargain in lighting" by "picking fixtures". Yet you meet hundreds like this every day. And so do we.

No *one* fixture will solve all lighting problems.

There are, in fact, literally thousands of luminaires engineered to do specific jobs. One may be the right answer—or it may take two or three.

Good lighting combined with practical economics takes the services of a qualified lighting engineer.

Whether you plan lighting, buy lighting or install lighting, the services of a Westinghouse lighting engineer are available to you.

J-04280

WESTINGHOUSE

Westinghouse
PLANNED LIGHTING PAYS

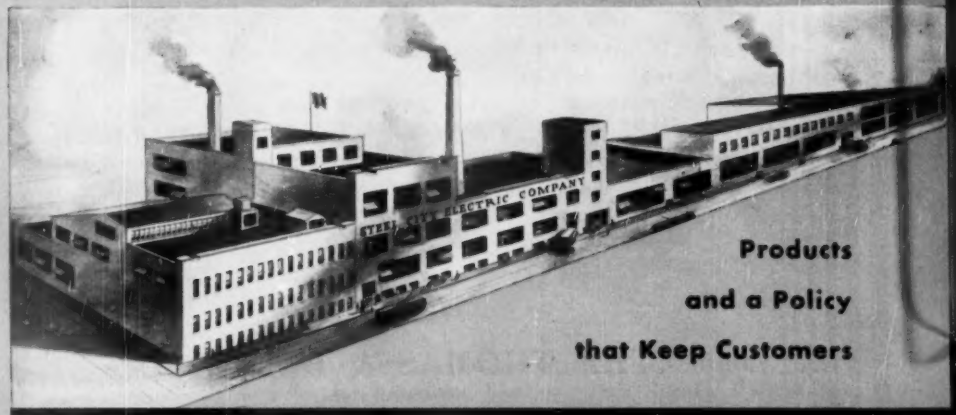
YOU NAME IT; WESCO HAS IT OR CAN GET IT

A Business is Known By the Customers it KEEPS

. . . . and Steel City Electric Company is proud to number Westinghouse Electrical Supply Company among the customers it has KEPT through many years, by supplying a line of Electrical Boxes and Fittings that back up its "You Can be SURE" slogan.

Customers of WESCO cannot only be SURE of the high quality of Steel City products, but they can be SURE that in Electrical Boxes and Conduit Fittings . . . .

Steel City Leads
In Meeting Contractors' Needs



Products
and a Policy
that Keep Customers

STEEL CITY ELECTRIC COMPANY

1207 COLUMBUS AVENUE, PITTSBURGH (12), PENNA.

USE THE EXPERIENCE OF TRAINED WESCO MEN

HERE WE STAND

On May 12th, 1939, The Thomas & Betts Co. publicly stated its long-established policy of doing business:

Never to by-pass the Distributor by direct sales of any T&B product at any time to any user.

And always to sell all of our Distributors, whether large or small, on exactly the same basis.

Today, November 1st, 1950, we reiterate our stand.

Nothing has happened to change our convictions or our policy. We still sell only through the T&B Distributor as heretofore; because he handles the distribution functions of our business cheaper and better than we could ourselves. Half a century's experience has convinced us that Wholesaler Distribution reduces the Manufacturer's selling cost and thereby reduces the selling price of electrical supply material to the user.

Under the T&B Plan, by every means within our power, we are telling his customers and prospects, and the world at large, the value of the Electrical Wholesaler's services to the users of electrical products.

T&B ENGINEERED

THE THOMAS & BETTS CO.

INCORPORATED

ELIZABETH 1, NEW JERSEY

Big Beam

PORTABLE ELECTRIC HAND LAMPS

(NOT FLASHLIGHTS)

and Automatic Auxiliary Emergency Lights

Daylight Visibility at the Flick of a Switch

UNLIMITED USES FOR CONTRACTORS, INDUSTRIALS, RAILROADS, UTILITIES AND OTHERS

BIG BEAM Jr. MODEL No. 111

THROWS POWERFUL BRILLIANT LIGHT

Only $6.75 Less Battery

Operates on one standard 6-volt lantern battery. Weighs only 48 ounces.

Especially designed for people at work or play who want bright light when and where they need it . . . and at a price that meets any pocketbook. Has 4-inch chrome finished lamphead and handle. Steel, weatherproof battery container finished in beautiful red durable baked enamel. Parabolic reflector, bulb and heavy glass convex lens give powerful spot or brilliant spread light.

Lamp - to - battery contacts — pressure type. No wires to connect. Battery replacement in 10 seconds.

Big Beam Model No. 211

Quality Built. Has Hundreds of Uses

Powerful 1500-foot beam or bright spread light. Main and auxiliary bulbs, 5" lamphead. Simple focus adjustment. Pressure type lamp-to-battery contacts. Light weight, compact, weatherproof. Accessories include Hold-Down Bracket for carrying in auto trunks, mounting on boats, etc. Operates on 2 standard 6-volt lantern batteries.

Price $12.50 Less Batteries

Big Beam Model No. 400-F

Combination Lantern and Signal Flare

Brilliant penetrating flare for use as highway warning light for trucks, buses and autos. Also ideal for farmers, campers and trainmen. Double-throw switch for steady or flashing light. Fresnel lens in clear, amber, red, green or blue. Meets I.C.C. specifications. Metal container available for carrying three units. Operates on 2 standard 6-volt lantern batteries.

Price $11.50 Less Batteries

Big Beam Model No. 700-A

Ideal for Fire and Police Departments

Powerful 2000-foot beam. Has hundreds of uses for contractors, utility repair crews, maintenance work on golf courses, airports, etc. Two-piece hinged battery case, 6" lamphead. Has simplified connecting plate with permanently attached cell-to-cell battery contacts. Many accessories. Operates on 4 No. 6 dry cell batteries.

Price $17.00 Less Batteries

Big Beam Model No. 1000

Throws Powerful Half-Mile Light Beam

This king of the dry cells is the choice of all who want powerful dependable portable light for night-time emergency jobs. Rugged construction. Beautiful finish. Many accessories. Operates on 1 standard 9-volt dry cell battery.

Big Beam Model No. 311

Most Powerful Rechargeable Hand Lamp

Projects brilliant half-mile beam. Specific gravity, built-in indicators tell at all times when storage battery needs recharging. No guesswork, no need for hydrometer, equipped with 100% spillproof storage battery.

Big Beam Model No. 312

Rechargeable Battery with Built-in Charger

Most modern portable hand lamp available. Has everything, including specific gravity ball indicators. Simply plug in cord on any 110-volt A.C. circuit when recharging is necessary.

Big Beam Model No. 700-D

Dual Head Portable Hand Lamp

Two swivel heads adjustable in all directions. Clear and red lens. For maintenance and repair work by railroads, utilities, construction crews, signaling, etc. Extension cord for operation from 6-volt storage battery.

BIG BEAM AUTOMATIC AUXILIARY EMERGENCY LIGHTS

Give Instant Automatic Lighting When Regular Current Fails

Big Beam Model No. 801

Instant lighting, meeting requirements of communities where ordinance requires auxiliary lighting for theatres, night clubs, hospitals, etc. Can also be used as portable hand lamp.

Big Beam Model No. 2-AD Special

Two floodlight heads give bright light during regular current failures. Built-in relay unit acts in reverse, instantly switches on bright diffused light. U.L. listed.

ACCESSORIES THAT INCREASE THE USABILITY OF BIG BEAM HAND LAMPS

Hold-Down Brackets • Hold-Down Swivel Fittings • Trouble Lamps and Cords • Leather Shoulder Straps
Snap-on-Lens—Flood and Colored • Wire Lens Guards • Big Beam Charger for Storage Battery Models.

Tested and Proved by Thousand of Users throughout the United States and Many Foreign Countries

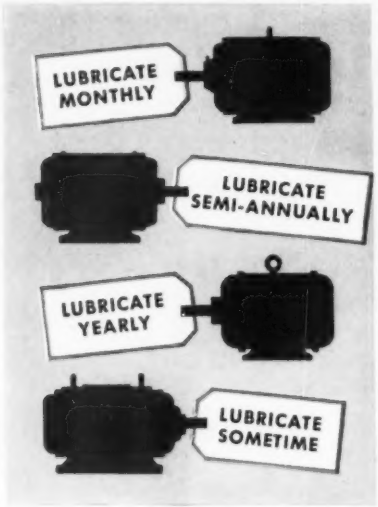
U-C LITE MANUFACTURING CO.

1036 West Hubbard Street
Chicago 22, Illinois

BUY FROM COMPLETE STOCKS CALL WESCO
FOR QUALITY ELECTRICAL SUPPLIES AND SERVICE

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



Why take a chance with "Once-in-a-while" lubrication?

Why fuss with motors that require lubrication "every so often?" Whether it's monthly, yearly, every two or three years, or just an indefinite "sometime," it is as much trouble remembering when to lubricate, as it is to do the lubricating. And it certainly isn't a very good way of making sure bearings get proper greasing attention.

There *is* one way to be *sure*. That's with Life-Line motors. Lubrication is *positive*. Bearings are pre-lubricated and factory-sealed. *No* further lubrication is required!

This is the modern way of lubricating motors. Development of special lubricants, up-to-date manufacturing methods and special seals have made it possible.

Records of nearly half a million motors, operating in every type of industry, indicate that pre-lubricated bearings offer: an average saving of $2.70 yearly per motor . . . 41% fewer motor outages due to faulty lubrication . . . complete freedom from lubrication attention.

Today, periodic lubrication is a costly nuisance. So why take a chance with it when Life-Line offers positive lubrication at no extra cost. See for yourself. Ask your Westinghouse representative for a copy of "Facts on Pre-Lubricated Bearings," B-4378, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-21559

—— If you figure LIFE-COSTS . . . you'll figure LIFE-LINE ——

Westinghouse *Life-Line* Motors

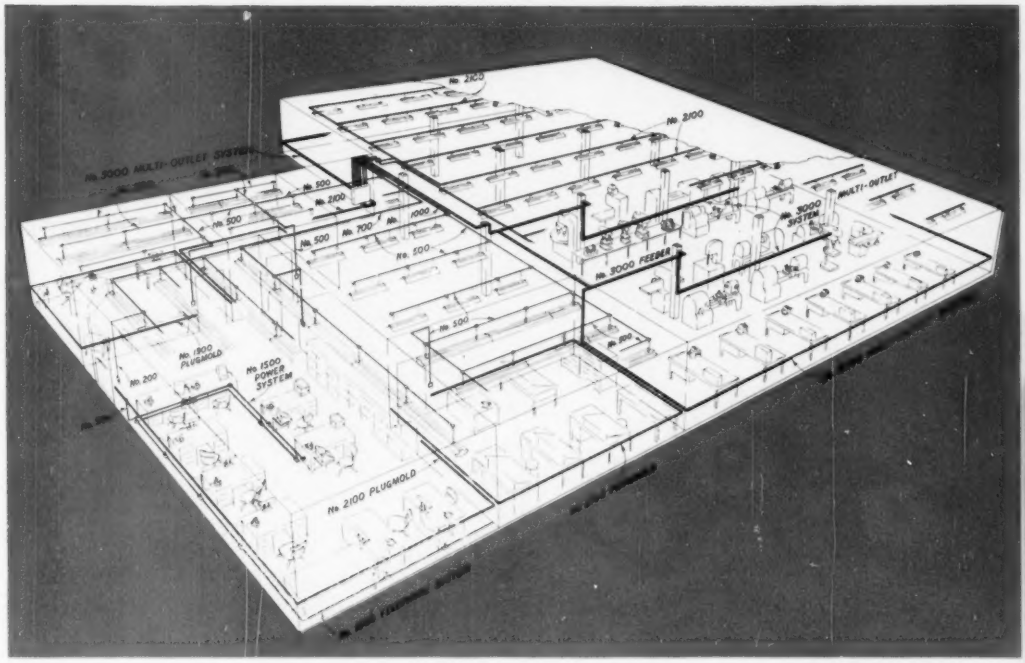
INDUSTRY'S LEADING MOTOR

FOR COMPETITIVE PRICES CALL WESCO

FOR QUALITY ELECTRICAL SUPPLIES AND SERVICE

ON ANY JOB..

LARGE or SMALL . . . . . SIMPLE or COMPLEX



SEE HOW EASILY YOU CAN

WIREMOLD *it*

As this layout shows, just about any kind of a wiring problem can be solved by the man who "knows his Wiremold."

Whether it is original installation, modernization, relocation or extension, the nine basic Wiremold Systems and their well designed fittings enable you to do the job fast and do it right . . . with no muss, no fuss and complete satisfaction to the customer.

Write for your Wiremold Wiring Guide if you do not already count this book "the handiest tool in your kit."

THE WIREMOLD COMPANY
HARTFORD 10, CONNECTICUT

The dependable Guide to ADEQUATE WIRING

FOR FAST SERVICE IN ANY EMERGENCY — CALL **WESCO**

So speaks experience, straight from the jobber who handles the best to satisfy his particular trade. And WAGNER Malleable Fittings measure up to this recommendation with characteristics of strict uniformity and exactness.

Fittings that can be depended upon for accuracy make installations just that much smoother and easier. The correct technique in our own foundry produces WAGNER Fittings to insure accuracy and complete on-the-job satisfaction. Any wonder then why you so often hear, "I'll say I recommend Wagner Fittings!"

Nationally distributed through leading wholesalers . . . WAGNER MALLEABLE PRODUCTS CO., 222 W. Adams Street, Chicago 6, Illinois. Foundry and Plant, Decatur 60, Illinois.

Approved by Underwriters' Laboratories, Inc.

WAGNER
MALLEABLE FITTINGS

"From Molten Metal to Finished Product"

FOR WHAT YOU NEED, WHEN YOU NEED IT—CALL WESCO

Until you try new Westinghouse fluorescent lamps you have no idea how good your lighting can really be

LONG LIFE
RATED AVERAGE LIFE
7500 HOURS
Gives 2½ years of service in average installations.

Day-to-day advances in the design and manufacture of Westinghouse fluorescent lamps have led to these results: longer lamp life, uniformity in color, greater end-to-end brightness, and higher light output. These are the things that add up to *economical, top-quality* lighting. And they can be yours at no extra cost!

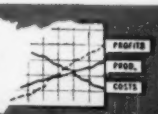
Lamp Division
Westinghouse Electric Corp., Bloomfield, New Jersey
Gentlemen:
I would like complete information about Westinghouse fluorescent lamps.

Name.....

Company.....

Address.....

FOR COURTEOUS, INTELLIGENT SERVICE – CALL WESCO



FOR SAFETY'S SAKE . . . USE CONDUIT *(Full Weight Rigid Steel)*

Buckeye for SAFETY first, last and always

FOR more than thirty-five years Youngstown Buckeye Conduit has been synonymous with safety. An entire generation of contractors has installed it when they wanted to insure positive, enduring protection for their wiring systems. That's why Youngstown Buckeye is . . and has been for years . . . the world's largest selling full-weight, standard-threaded, rigid steel conduit.

Youngstown
BUCKEYE CONDUIT

THE YOUNGSTOWN SHEET AND TUBE COMPANY General Offices — Youngstown 1, Ohio

Manufacturers of Carbon, Alloy and Yoloy Steel Export Office-500 Fifth Avenue, New York

PIPE AND TUBULAR PRODUCTS - CONDUIT - BARS - RODS - COLD FINISHED CARBON AND ALLOY BARS - SHEETS - PLATES - WIRE - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - TIE PLATES AND SPIKES.

FOR WIDE-AWAKE "INSIDE SERVICE"—CALL WESCO

Safeway LŌVOLT

ASSURES YOU MAXIMUM SAFETY
REGARDLESS OF CONDITIONS

FOR YEARS DANIEL WOODHEAD
HAS MADE **PRŌTEX**
THE *BEST* PORTABLE
HAND LAMP

NOW... PRŌTEX

PLUS A **SAFEWAY LŌVOLT**
TRANSFORMER GIVES YOU A
COMPLETELY *SAFE* PORTABLE
UNIT FOR BOILERS . . .

. . . TANKS
AND ALL OTHER
HAZARDOUS WET LOCATIONS

THERE'S "SAFETY FIRST" WITH A SAFEWAY LŌVOLT

The user of a Safeway LoVolt Transformer can be certain that every possible precaution has been taken to insure the prevention of death or injury from short circuits and other electrical hazards. The transformer is double wound and the primary side grounded and provided with three-conductor cable with suitable means for grounding at the cap.

SAFEWAY LŌVOLT WATERTIGHT AND ECONOMICAL

Each end has a sealing gland which prevents water seepage. Oil resisting synthetic rubber in cable cover and handle guards against deterioration due to oil or grease.

Necessary repairs can be easily made . . . broken or injured cables can be replaced by simply removing the bolts from the cover, slipping out the old cable and replacing with the new.

2525

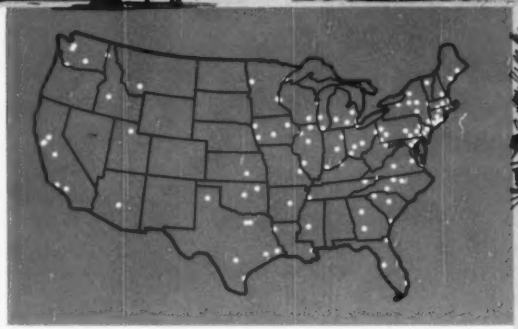
DANIEL WOODHEAD COMPANY
15 North Jefferson Street, Chicago 6, Ill.

FOR DELIVERIES TO MEET WORK SCHEDULES—CALL WESCO

What you need . . . .

When you need it . .

Where you need it . .



FROM ONE SOURCE OF SUPPLY LOCATED NEAR YOU

CALL YOUR NEAREST WESCO BRANCH FOR EVERYTHING ELECTRICAL

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Allentown, Pa. 4-5105
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Binghamton 60F, N. Y. 4-1364
Boise, Idaho .....Boise 7611
Boston 10, Mass. .....Copley 7-3100
Burlington, Vt. 1924-5
Butte, Montana 2-1269
Charlotte 1, N. C. 5-3715
Chicago 7, Ill. .....Taylor 9-5000
Cincinnati 6, Ohio .....Capitol 1300
Clarksburg, W. Va. 4-6311
Cleveland 14, Ohio .....Tower 1-5660
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Columbia (A), S. C. 8145
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Evansville 8, Ind. 5-7276
Fargo, No. Dak. 4266
Flint 7, Mich. 4-8623
Ft. Wayne, Ind. .....Anthony 3421
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Raleigh, N. C. 3-4841
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Richmond 19, Va. 3-0111
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Rochester 7, N. Y. .....Monroe 1635
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San Antonio 2, Texas C-6216
San Francisco 1, Cal. . . .Underhill 1-5051
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Seattle 4, Wash. .....Elliot 7001
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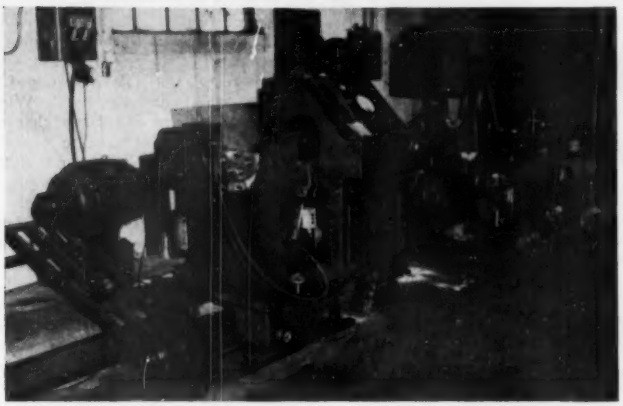
Westinghouse Electric Supply Company

A NATIONAL DISTRIBUTING ORGANIZATION WITH 107 BRANCH OFFICES

Motor Shops



GISHOLT BALANCING MACHINE with 7-ton capacity has ample testing facilities for checking conditions of rotational balance in large equipment. Installation of the machine eliminated the time and expense of shipping parts out for testing; also brought in added business from other shops not having these testing facilities.

Dynamic Balancing Brings Added Testing Orders

Heavy marine work frequently requires the dynamic balancing of large rotating parts to keep vibrations at a minimum in power plants of large ships. This requirement led to the installation of a Gisholt balancing machine in the shop of the Marine Electric Company of Portland, Oregon. Since the availability of these machines was restricted at the time of placing the order during the last war, it was necessary to take delivery on a unit larger than was considered necessary at the time. However, installation of this 7-ton capacity balancer has paid dividends for, since obtaining it, Marine Electric has had several assignments that could not have been handled on a smaller unit.

Economically, the machine makes a double return, for it eliminates the necessity of shipping rotating parts to distant testing points, and it brings in added work from shops in the area not equipped to perform this service. The advantages, therefore, include the ability to accurately locate and correct conditions of unbalance; the guarantee of a vibrationless rotating part; the savings in time and labor to perform these tests; the elimination of trucking and testing charges that would be incurred if work was sent to another testing point; and the receipt of added testing orders from nearby plants or shops not similarly equipped.

Vapor Spray Cleans Motors

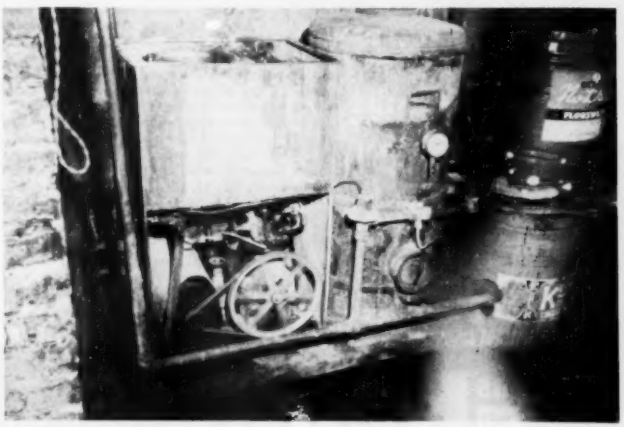
There are a number of ways to clean motor stators, end bells and other electrical equipment parts. Chemical degreasers, sand blasting, liquid detergents and other types of pressure sprays are used in various repair shops throughout the country.

A steam vapor spray does the job at the Hammond Electric Company in Hammond, Indiana. Economical and effective, it utilizes ordinary city water mixed with a powdered detergent and is transformed into vapor in a small boiler.

Components of the VapoSpray unit are a tank with a sieve-type agitator in which the detergent (Kerrick Vapor Cleaning Compound) is placed; a pump; and a gas-fired boiler in which the mixture is turned into a steam vapor at 75 pounds pressure. The spray comes out at the end of a hose-connected nozzle, and the residue solution passes down the regular city sewer drain.

Shop owner Fay Eads reports this cleaning scheme readily dissolves the grease, grime and other accumulations found on motors—including those coming from chemical plants. Cleaning is done in an open booth equipped with an overhead hoist to suspend the parts.

VAPOR SPRAY detergent under 75 pounds pressure cleans a motor and bell in an open booth.

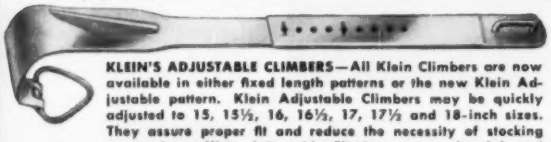


MIXING UNIT where detergent and city water are mixed, then turned into a steam vapor in adjacent gas-fired boiler.

new additions to the KLEIN LINE

Mathias Klein & Sons continues to offer the electrical industry the most complete line of pliers and equipment on the market. Below are three additions to the Klein Line that have found favor with many utility companies. If you have not had complete information on this equipment, write for details.

Since 1857



KLEIN'S ADJUSTABLE CLIMBERS—All Klein Climbers are now available in either fixed length patterns or the new Klein Adjustable pattern. Klein Adjustable Climbers may be quickly adjusted to 15, 15½, 16, 16½, 17, 17½ and 18-inch sizes. They assure proper fit and reduce the necessity of stocking many sizes. Klein Adjustable Climbers are made of forged steel, individually tempered and tested. Aluminum finish.

No. 1943 KLEIN POLE MASTER CLIMBERS—Klein "Pole Master" Climbers are made in matched pairs with an offset shank that brings the gaff in proper line with the leg bone. Extra wide stirrup gives more arch support. Available in fixed length pattern sizes 15, 15½, 16, 16½, 17, 17½ and 18 inches. Also available in adjustable patterns to fit any of above lengths. Aluminum finish.

No. 5249 "KLEIN-LINE" TOOL BELT—This new belt is designed with a full-floating sliding trace of famous "Klein-Kord." Trace slides freely, allowing approximately 6 in. movement. Chafing is avoided, and undue wear on safety strap is prevented. Apron design permits visual inspection of trace throughout its entire length.

A soft, pliable latigo leather cushion 4¾ inches wide is pad-lined and edge rolled for comfort. The 2-inch wide belt shape is of heavy harness leather with a drop forged buckle. Made in following sizes: 36, 38, 40, 42, 44 and 46 inches.

Ask Your Supplier
Foreign Distributor: International Standard Electric Corp., New York

The New Klein Catalog giving full information on the complete Klein line will be sent on request.

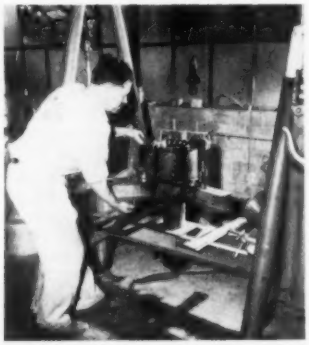
Mathias KLEIN & Sons
Established 1857 — Chicago, Ill., U.S.A.
3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS

Stator Strip and Burn-out Station

Stator coils are removed at a combination burn-out and stripping station in the motor repair department of Dowzer Electric Machinery Works, Inc., Mt. Vernon, Illinois. After one side of the coils has been cut with an air chisel, the stator is clamped to the gas-fired burn-out pedestal. When the windings are completely charred, the frame remains on the pedestal while the coils are pulled out of the slots by an air-operated tong-type claw.

The combination station is built around a heavy gantry that supports both the pedestal and coil-puller mechanism. The Y-shaped pedestal is constructed of two 4-inch channels (16-inches long) per leg, mounted back-to-back on spacer blocks and welded to a heavy pipe collar that permits 360-degree rotation in the horizontal plane. Stator clamps ride in the slots formed by the spacer blocks.

GAS BURNER is attached to threaded gas pipe extending up through center of burn-out pedestal.

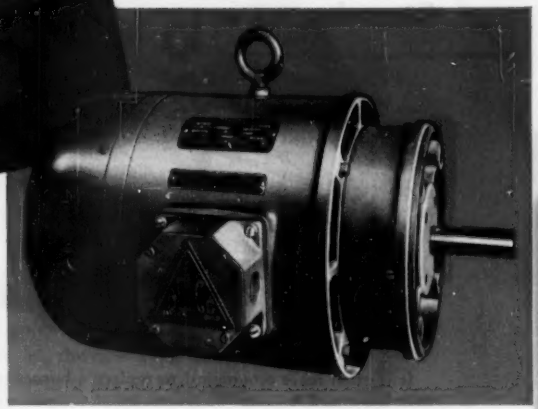


STATOR IS CLAMPED to the "arms" of the Y-shaped pedestal. Metal cover is placed on stator during burn-out operation.

Introducing — 3 New

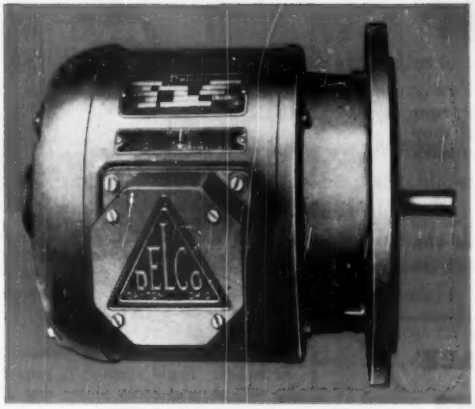
FLANGE-MOUNTED INDUCTION MOTORS by Delco

The recent addition to the Delco motor line of the three flange-mounted integral motors here pictured extends Delco's range of usefulness in the industrial field. The phrase "Delco Preferred" will now appear on motor specifications for machine tools, pumps and other classifications with even greater frequency than before.



TOTALLY ENCLOSED FRAME FAN-COOLED BALL BEARING SQUIRREL CAGE INDUCTION MOTOR

Shown with C type flange. Available with C or D type flange, through 365 frame.

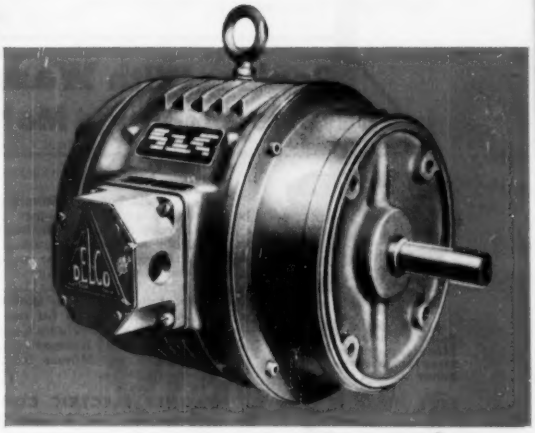


OPEN FRAME BALL BEARING SQUIRREL CAGE INDUCTION MOTOR

Shown with D type flange. Available with C or D type flange, through 365 frame.

TOTALLY ENCLOSED FRAME NOT FAN-COOLED BALL BEARING SQUIRREL CAGE INDUCTION MOTOR

Shown with C type flange. Available with C or D type flange, through 254 frame.



DELCO MOTORS

DELCO PRODUCTS

Division of General Motors Corporation, Dayton, Ohio

New and interesting—"MOTORS ON PARADE"—a 16 mm sound film now available for group showings. Write Delco Products for full information.

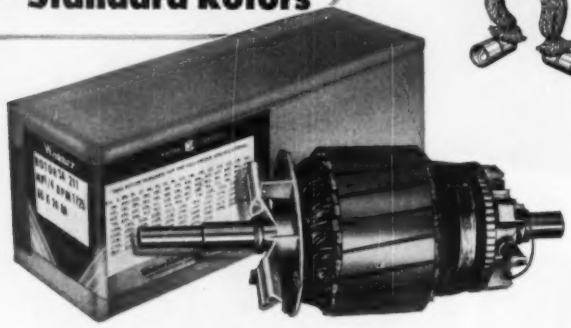
Offices in Chicago, Cincinnati, Cleveland, Dallas, Detroit, Hartford, Philadelphia and St. Louis. Also available through United Motors Service branches.

DELCO DAYTON OHIO

Genuine Joe Says:

BE PROFIT-WISE

Stock Wagner Standard Rotors



It is often more economical to replace a burned-out rotor than to rewind it . . . small motors move through your shop *fast* and your winders are kept free for larger jobs that make more profit for you.

Rotor replacement is a simple 1-2-3 job when you keep a stock of Wagner replacement rotors on hand. The *exclusive* "tell-all" label on the Wagner Rotor Package, when used with Wagner's K & M specification lists, takes all the guesswork out of rotor replacement on Wagner motors.

Replace With Wagner Service Exchange Motors

BE PROFIT-WISE . . . Stock a few new Wagner Motors, too. You'll find many instances when a new motor means a ready sale.

You can build lasting customer satisfaction by keeping a stock of Wagner Service Exchange Motors on hand—for emergencies—for occasions when your customer needs immediate service—and for the replacement of motors that are "too far gone" to repair economically. Wagner Service Exchange Motors are fully guaranteed against defective material or workmanship for one year. The service exchange plan includes Capacitor-Start Motors from 1/6 to 1/3 horsepower and Repulsion-Start Induction Motors from 1/6 to 5 horsepower inclusive.

WAGNER ELECTRIC CORPORATION
6413 Plymouth Ave., St. Louis 14, Mo., U. S. A.

Wagner Electric Corporation EST. 1891

BEARINGS · BRUSHES · CAPACITORS
COMMUTATORS · STANDARD ROTORS
SERVICE EXCHANGE MOTORS · NEW MOTORS

450 AUTHORIZED SERVICE STATIONS OR PARTS DISTRIBUTORS

M550-1

EXTRA BURNERS are racked on gantry frame. Units have diameters ranging from one to nine inches to fit different size motors.

COILS ARE PULLED from stator after windings have been thoroughly charred. Gripping claw is attached to steel cable operated by air cylinder controlled by foot pedal.

Working height of the pedestal is 32 inches. Rigid support is provided by two channel cross pieces that also serve as a handy "table" for stator clamps, wedges, and other tools and accessories.

Gas burners are attached to a threaded gas pipe rising up through the center of the pedestal. The "can" type burners are all 4½ inches high; vary from one to nine inches in diameter for various sizes of stators; have rows of pin holes around the sides to emit a low-heat flame.

By selecting a can to fit the stator being stripped, the flame is brought into close proximity with coils, increasing burning efficiency and cutting the required roasting period for this operation.

A foot pedal controls operation of the coil puller, leaving both of the mechanic's hands free to adjust and release the gripping claw and remove the old coil turns.

THIS WIRE TAKES TOP HONORS IN CHEMISTRY!

Wherever chemicals abound, as in chemical plants, dairies, breweries, seaside areas, mines, well holes, the new Type AZ Cable insulated and sheathed with VINYLITE Brand Plastics is winning top-of-the-class honors!

This non-metallic sheathed cable, reinforced with glass fiber, not only resists alkalies and most strong acids, but has a phenomenal ability to withstand moisture, fungus and aging. VINYLITE Plastic has remained unharmed after seven years' immersion in water—and twelve years' burial in the ground.

In addition, it provides utmost resistance to flame, sunlight, extreme heat, cold, and abrasion.

Non-metallic sheathed cables using VINYLITE Plastic materials are smooth, small in diameter, clean to handle, easy to install, mar- and impact-resistant, and highly flexible. They slip easily through narrow spaces and around sharp corners without damage.

Combining low cost with long life and dependability, these highly chemical resistant cables represent a big advance in general-purpose electric wiring. It will pay you to investigate further. For full information, write Dept. IK-41.

Data courtesy The Plastic Wire & Cable Corp, Jewett City, Connecticut

Vinylite BRAND PLASTICS

BAKELITE DIVISION UCC

BAKELITE DIVISION, *Union Carbide and Carbon Corporation*, 30 East 42nd Street, New York 17, N. Y.

74% of all new homes have one or more ventilators!

GET MORE OF THIS BUSINESS by Selling

FASCO Automatic VENTILATORS

For Kitchens, Bathrooms, Playrooms, Laundries

Models 1020-1021 (10")
"Ceil-N-Wall" Ventilator
For ceilings and inside walls

CASH IN on this tremendous market . . . with FASCO ventilators . . . outstanding from every angle—quality, performance and price. Designed in collaboration with America's leading home builders, FASCO ventilators are quickly and easily installed in all types of construction. They move more air for less money. (There are *15,000 FASCO ventilators in Levitt houses alone!*) Models for outside walls, or for ceilings and inside walls. Order now for your share of these steadily increasing profits.

Models 844-846 (8")
1044-1046 (10")
For outside walls

WRITE, WIRE or PHONE for complete information. FASCO Industries, Inc., 35 Union St., Rochester 2, N. Y. (Phone HAmilton 1800.)

FASCO Industries, Inc.
ROCHESTER 2, NEW YORK

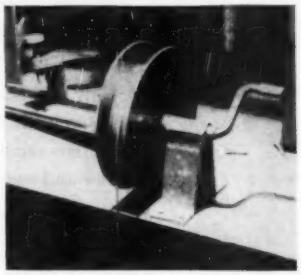
Rewind Reel For Wire Solder

Motor repair shops use a considerable quantity of wire solder and hence purchase it in large lots of heavy spools. In the larger shops, many mechanics have occasion to use the solder and like to have their own "coil" on their respective benches.

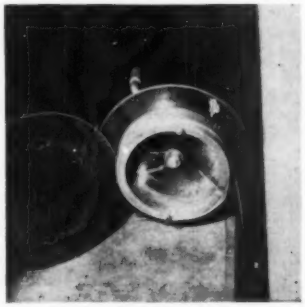
At the Koontz-Wagner Electric Company in South Bend, Indiana, coiling wire solder in small quantities is a simple operation. It is done quickly and efficiently on a solder rewind reel mounted on one of the work benches.

The reel is constructed of two 6-inch diameter disks of ¼-inch steel plate and a 4-inch diameter brass drum with a taper on its outer surface. One disk is welded to the drum; the other is mounted by two slotted-holes which fit over machine screws on the drum edge. The stationary disk is welded to a hand crank supported by an A-bracket mounted to the bench top.

To rewind the solder, the mechanic places one end in a slot cut in the drum edge and turns the hand crank until the desired amount is wound. The large spool of wire solder is supported on a spindle under the table. After cutting the solder, the mechanic removes one side of the rewind reel.



REWIND REEL is used to make individual coils of wire solder for shop mechanics.



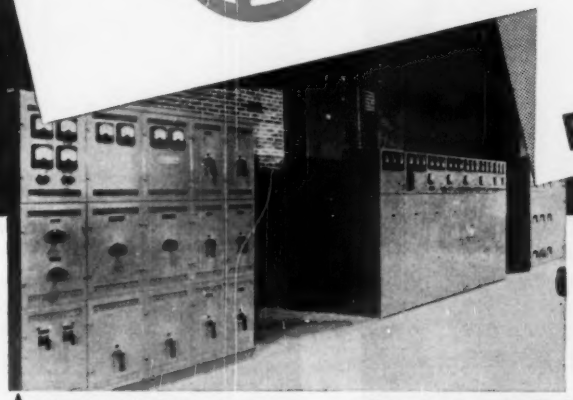
SOLDER IS WOUND around tapered brass drum welded to reel disk. One side of reel is removable so coil can be taken off drum.

For *more dependable* Switchgear, Specify

For *more dependable* Insulation, Specify

NATVAR 400

EXTRUDED VINYL TAPE



I-T-E MULTUMITE Switchgear is compact and efficient. It is designed and built to provide positive protection of secondary distribution systems with an extra margin of safety for uninterrupted service. Instrument transformers are designed specifically for switchboards.

Natvar 400 Extruded Vinyl Tape is used on this Type C-2, 5,000 volt, 600 amp. primary transformer coil to protect the instrument circuit, because it has good dielectric strength, requires fewer layers than VC, is flexible enough to conform to sharp bends without wrinkling, and because it has adequate heat resistance.

Natvar Products

- Varnished cambric—straight cut and bias
- Varnished cable tape
- Varnished canvas
- Varnished duck
- Varnished silk
- Varnished special rayon
- Varnished Fiberglas cloth
- Silicone coated Fiberglas
- Varnished papers
- Slot insulation
- Varnished tubings and sleevings
- Varnished identification markers
- Lacquered tubings and sleevings
- Extruded vinyl tubing and tape
- Extruded vinyl identification markers

Ask for Catalog No. 21

For more than 60 years I-T-E has been known in the electrical industry for the *quality* of its products. This reputation has been maintained through sound engineering and manufacturing skill.

Component parts and materials that go into I-T-E Switchgear are the finest obtainable, and are carefully coordinated into efficient functional units. Natvar 400 extruded vinyl tubing and tape and other Natvar flexible insulations are used because they consistently meet I-T-E's rigid requirements.

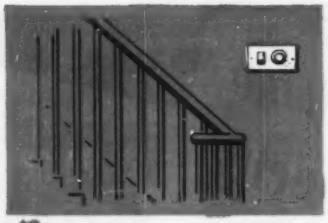
Natvar 400 and other Natvar flexible electrical insulating materials are available for immediate delivery, either from your wholesalers' stocks or direct from our own.

THE NATIONAL VARNISHED PRODUCTS Corporation

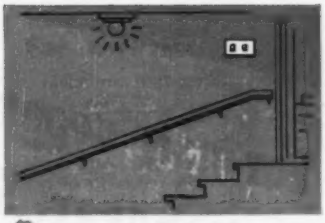
Telephone Rahway 7-3300 — Cable Address NATVAR: Rahway, N. J.

205 RANDOLPH AVENUE ★ WOODBRIDGE, NEW JERSEY

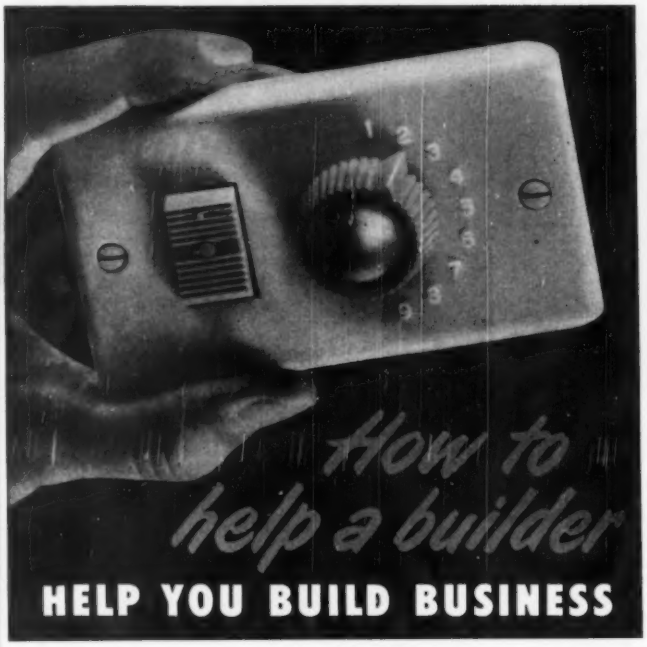
1 Suggest master selector switch for master bedroom. Tell him home buyers are excited about the idea of controlling fans, coffee makers, and lights right from bedside.

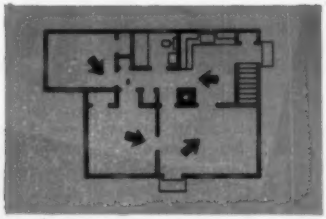


2 Show him how master selector switch can be placed in front entrance hall, to provide over-all control of lights and outlets. Gives him a strong talking point the minute a prospect enters.

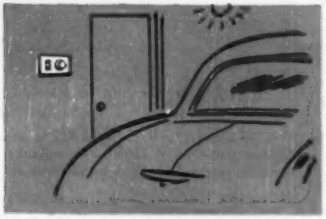


3 Remote control permits practical extension of the usual two-point control of cellar or attic light by providing a switch at the bedside, for these often forgotten lights . . . a strong selling point.





4 Explain the pathway-of-light idea. Help him plan so that home owner can light his way through the house, turning lights ON and OFF as he goes — with G-E remote-control switches.



5 For outside lights, porch lights, breezeway lights, garage lights — remote control is a natural. Control them from entrance hall, rear door, and at the lights themselves.

Merchant builders can always use a real selling feature. And—right now—you're in a position to give it to them.

To help your builder increase his sales—to help yourself build more business on every house—show him the new General Electric master control switch. It makes a real talking point for you. It's something he can actually show his prospects.

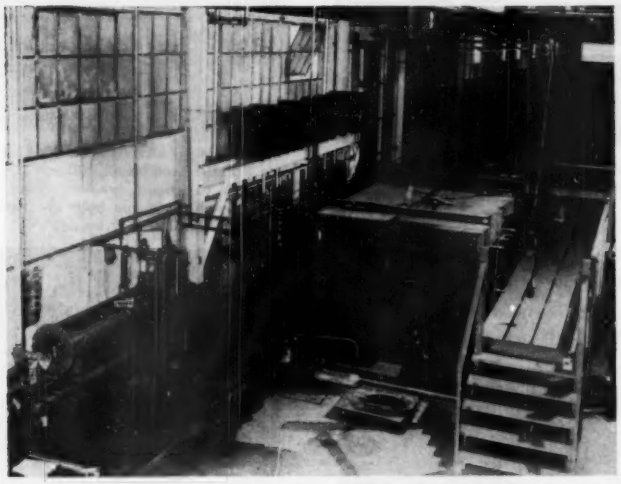
Pick up one of these new master control switches from your General Electric distributor. Show it to your builder, and explain some of the conveniences he can add to his homes. It means a small added expense to him—extra business for you on every house.

It will pay you to be first in your community to offer General Electric remote control. So see your distributor now for facts on General Electric remote control. For a handbook on the General Electric remote-control wiring system write to Section D7-1118, Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

You can put your confidence in—

GENERAL ELECTRIC

Practical Methods



ELECTRIC FURNACES rated at 135-kw each are used for stress-relieving annealing of gas-turbine aircraft frames in the San Diego plant of the Solar Aircraft Co.

Jet Engine Parts Electrically Annealed

MANUFACTURING

A carefully controlled annealing cycle, to relieve stresses within stainless steel turbo-jet aircraft engine frames, is obtained by the Solar Aircraft Company in San Diego, California, through the use of two G. E. electric furnaces. The furnaces are of the rectangular pit ribbon resistor types and are capable of annealing four frames simultaneously, two in each furnace. Situated side by side, either furnace can be charged by lifting the lid with an overhead hoist and depositing it temporarily on top of the adjacent furnace. The aft-frames of the turbo-jet engines are placed in the furnaces by means of the same hoist.

Ribbon resistors, supported on the furnace walls, provide radiant heat to bring the equipment up to the required temperature. An atmosphere gas converter supplies a protective atmosphere (consisting of carbon dioxide, nitrogen, carbon monoxide and hydrogen) and a cooling system permits forced but regulated cooling after the heating cycle is completed.

Turbo-jet engine frames are placed in the furnaces at 500 degrees F. The temperature is then raised at the rate of 100 degrees an hour to 1650 degrees. It is maintained at that level for three hours, then allowed to cool at the rate of 200 degrees an hour until 500 is reached, at which time the frames are removed. In this way, the frames are completely relieved of stress without objectionable oxidation. Program instrument controllers can be set so that the cycle is automatic.

Both of these G. E. furnaces are rated at 135 kw.

Simplified Hi-Pot Taps

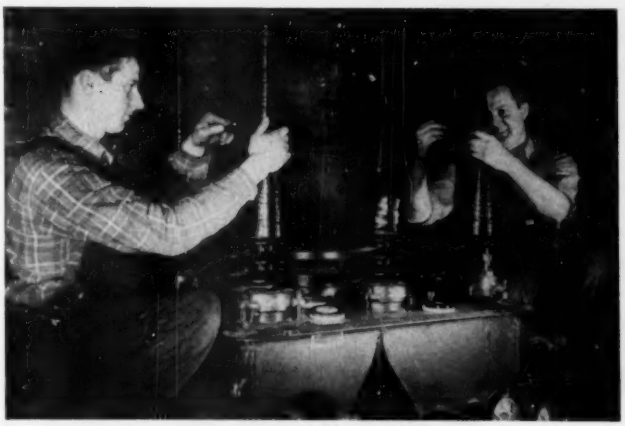
CONSTRUCTION

Progress is the by-word of Monroe Electric Company, one of Chicago's enterprising electrical contracting firms. During the past 30 years, Monroe has been adapting new methods and materials to its construction activities.

Latest development is a two-step technique that cuts by two-thirds the time required to build up high-voltage stress cones on circuit breaker and transformer connections. The method was used on 12,000-volt leads to two 500-kva. air circuit breakers installed at a Chicago Sanitary District pumping station. Monroe electricians built up the cones with cotton fabric and "Scotch" Brand No. 33 plastic-backed electrical tape. To build the insulation up to 30,000 volts—2½ times actual voltage—it took one-third of the time formerly required to finish such an installation. Previous methods involved the use of four materials—sealing compound, two different tapes, and a Glyptal coating.

The same technique was used on stress cones of six single-phase, Pyranol-cooled, 12,000-volt transformers. Four laps of tape were applied to the 12,000-volt primary leads and two laps to the 2,400-volt secondary cables. Splices and taps to the 12,000-volt cables were also wrapped with the plastic-backed tape.

The tape used—"Scotch" 33 elec-



BUILDING UP STRESS cones on 12,000/2,400-volt transformer leads. Two-step method uses cotton fabric and "Scotch" 33 electrical tape as finish wrap (four layers); cuts time by two-thirds.

SORGEL AIR-COOLED TRANSFORMERS

For every purpose—

¼ to 1000 Kv-a. Single phase.
1 Kv-a. to 2000 Kv-a. 3-phase.

To operate 115 volt lighting and portable equipment from 230-460 or 575 volt power circuits.

To operate special equipment from standard circuits.

To change odd voltages to standard voltages and phase changing.

Also—Series street lighting transformers.
Electronic and Rectifier Transformers.
Signal transformers.
Control transformers.
Pipe thawing transformers.
Soldering and Brazing Transformers.
Special custom-built transformers.

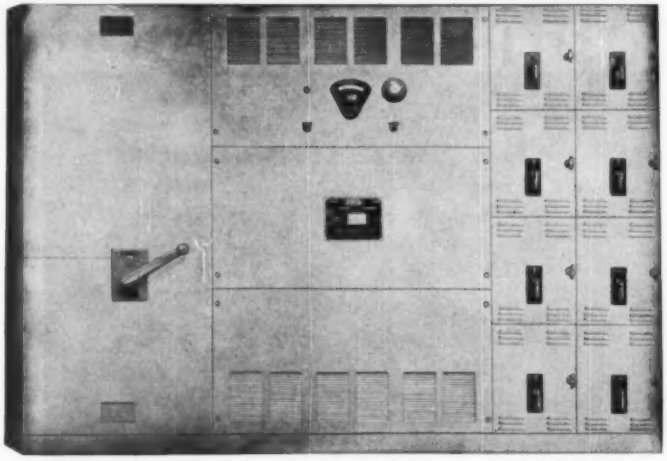
¼ Kv-a. Single Phase. 460/230 to 115 volt.

15 Kv-a. 3-phase Wall mounting type Showing connection compartment with solderless terminals.

Unit Sub-Stations

For interior high voltage distribution systems with transformers at load centers.

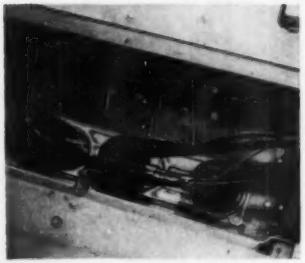
Sizes up to 2000 Kv-a. and up to 15,000 volts.



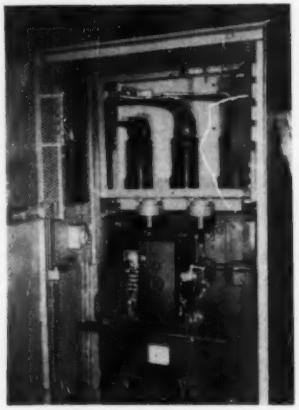
Sales Engineers in Principal Cities

SORGEL ELECTRIC CO., 834 W. National Ave., Milwaukee 4, Wis.

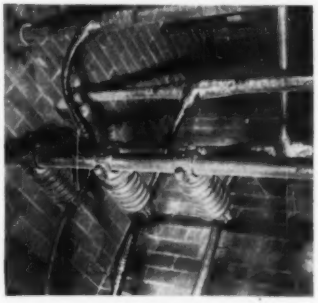
Pioneers in the development and manufacturing of Air-Cooled transformers



MINIMUM SPACE is taken up by vinyl-plastic tape on 12,000-volt connections to circuit breaker. Cotton fabric with tape wrap built up stress cones to 30,000-volt insulation.



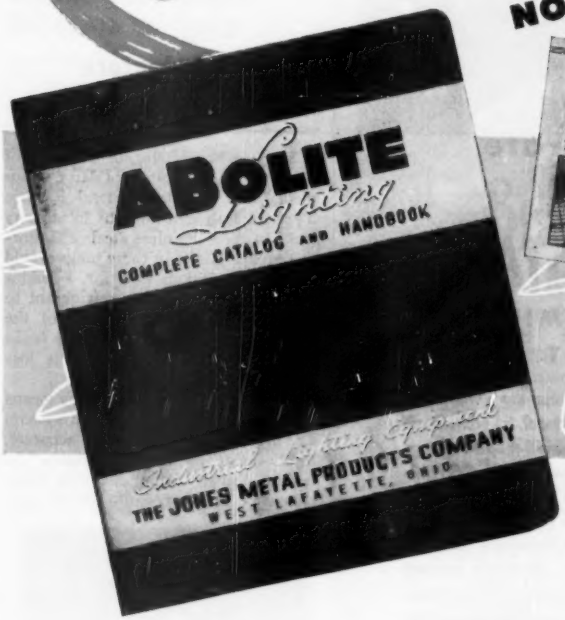
12,000-VOLT CONNECTIONS to 500-kva. air circuit breaker are heavily wrapped with vinyl-plastic tape as finish application on top of cotton fabric. 30,000-volt insulation takes minimum of space.



SPLICES AND TAPS to 12,000-volt insulated bus were wrapped with vinyl-plastic "Scotch" 33 electrical tape. Result: less bulk; neat connection.

trical tape—has been tested by Underwriters Laboratories, Inc., for temperatures up to 176 degrees F. According to the manufacturer's laboratory reports the tape has a dielectric strength of over 7,000 volts; has "excellent" resistance to sunlight, aging,

NEW ABOLITE LIGHTING Catalog & Handbook NOW AVAILABLE!



PACKED WITH USEFUL INFORMATIVE TEXT AND ILLUSTRATION ON THE COMPLETE ABOLITE LINE... REFLECTORS, HOLDERS, SOCKETS AND ACCESSORIES

The new Abolite Lighting Catalog & Handbook contains complete information on the application and installation of Abolite equipment. It was designed for the convenience and use of industrial and commercial users of lighting equipment.

THE JONES METAL PRODUCTS CO.,
West Lafayette, O.

NEW IDEAS FOR BETTER PLANT LIGHTING

NEW WAYS TO MORE EFFECTIVE FLOODLIGHTING

ACT NOW! MAIL THE COUPON FOR YOUR COPY OF THIS NEW LIGHTING HANDBOOK.

WHITER THAN WHITE
ABOLITE Lighting

Please send me, without obligation, the new Abolite Lighting Catalog.
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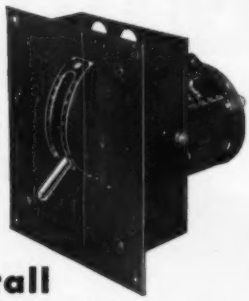
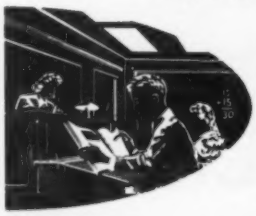
Here is

"low budget"

LIGHT
DIMMING
EQUIPMENT

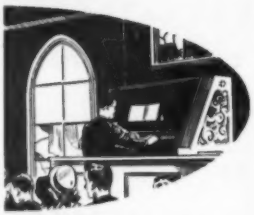


- low cost
- easy to install
- simple to operate
- flexible in use

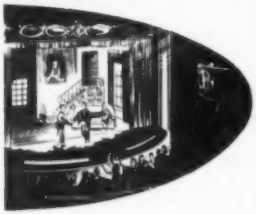


POWERSTAT

LIGHT DIMMING
EQUIPMENT



New light dimming equipment is within the reach of the many school, church, community, amateur and small theatre groups who operate on a low budget. POWERSTAT Dimmers are low in first cost, easy to install, inexpensive to operate and flexible in use. These Underwriters' Laboratories approved units efficiently convert power and do not dissipate it in the wasteful form of heat. They are flexible in that any number of lamps up to the rated capacity can be controlled.



Type D1000H, shown above, is a typical example of a low cost POWERSTAT Dimmer. It is the only unit of its size and cost with vertically operated handle and drum markings. It handles any load up to 1000 watts. Write for Bulletin 749 for information on the D1000H and other low cost POWERSTAT Dimmers.

Write 6110 Demers Avenue, Bristol, Connecticut

THE SUPERIOR ELECTRIC CO.
BRISTOL, CONNECTICUT

POWERSTAT VARIABLE TRANSFORMERS • VOLTBOX A-C POWER SUPPLIES • STABILINE VOLTAGE REGULATORS

water, salt water, acids and alkalis. Resistance to alcohols, oils and aliphatic hydrocarbons (like ethylene and acetylene series) is rated as "good." The plastic backing is reportedly abrasion resistant and provides a stretch of 125 percent at breaking point, permitting the tape to conform to irregular surfaces.

Electricians on the project found the tape's thinness (0.0007-inch) particularly useful on close connections. Monroe's president R. J. Stretch pointed up the saving in labor, the easy way the tape is dispensed and added that this material is being used on all underground cable splices his company encounters in its many maintenance and repair jobs.

Electric Detectors Locate Tank Leaks

TESTING

McHale Manufacturing Company of Los Angeles, fabricators of dairy equipment, have installed General Electric Type H leak detectors to locate any leaks in their stainless steel milk storage tanks. Leaks in these tanks would represent a serious loss, for, should a leak develop and admit refrigerant to the milk, the entire contents of the tank would be spoiled. Since the tanks hold up to 15,000 gallons, this loss would be considerable.

Testing was formerly done by means of a bulky pressure hydraulic system. The present leak detectors are accurate, lightweight and readily portable. In testing, a small amount of carbon tetrachloride is introduced into the refriger-

LEAK DETECTOR is used to detect flaws in welded seams of milk storage tanks manufactured by the McHale Manufacturing Company of Los Angeles. Detector is a Type H General Electric unit. Head phones and indicating dials notify detector operator when leaks are present.

ating system. The barrel of a hand-held detecting gun is passed along the weld and, when a leak is passed, an indicator on a control unit to which the gun is attached instantly records the presence of the carbon tet.

The control unit operates from 115-volts ac, 60 cycles. It can be hand held or carried by a shoulder strap. Headphones can be used in conjunction with the unit to give an audible signal when a leak is located. The instrument is so sensitive that a leak, so small that only one hundreth of an ounce of carbon tetrachloride will filter through it in a year's time, can be instantly spotted.

On-the-Spot Check Of Cable Weights

CONSTRUCTION

One method of determining just how much cable has been pulled in a long run is to weigh the cable reel before the pull and again after the cable has been installed. A simple calculation then determines how much cable is left on the reel.

This can be done quickly on the job site by using the suspended weighing technique with a portable scale which fits on a crane or hoist hook. The reel can be lifted from its jacks by truck boom and weighed before and after the pull. Illustrated in the accompanying photo is such a scale—the Dillon Weight Indicator—suspended from a crane hook and checking the weight of a 4,700-pound reel of cable.

The same method can be used to check weight of poles, quantities of conduit and other equipment to prevent overloading of trucks carrying the material to and from the job site.

SUSPENDED SCALE permits quick check of cable reel weight before and after cable has been installed. Simple calculation indicates amount of conductor left on reel.

For An Easy, Profitable, SATISFYING INSTALLATION!

"Buffalo"

BELT-AIR FANS

- SQUARE FLANGED PANEL WITH PRESSED KNOCKOUTS for faster, easier installation in walls!
- RUGGED CONSTRUCTION THROUGHOUT — good for many years on the job — small servicing requirements!
- EFFICIENT PERFORMANCE that builds good will and profits for you!
- A WIDE CHOICE OF FANS TO HANDLE ALL YOUR JOBS—write for Bulletin 3222-F and prices!

Facts To Make Your Job Easier!

You'll get better results using FAN ENGINEERING! Gives you 808 pages of practical answers to your air problems. Pocket size. ORDER NOW!

$6.00 Postpaid

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PANEL BREEZO FANS BELTED VENT SETS BELT-AIR FANS

BREEZ-AIR ATTIC FANS "L" BREEZO FANS "NV" BREEZO FANS

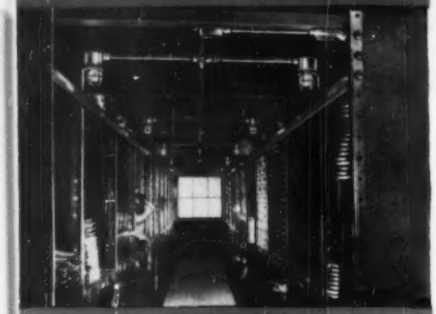
CONDULETS* and rigid conduit

YOU can install galvanized CONDULETS and galvanized rigid conduit under all atmospheric conditions and in all occupancies

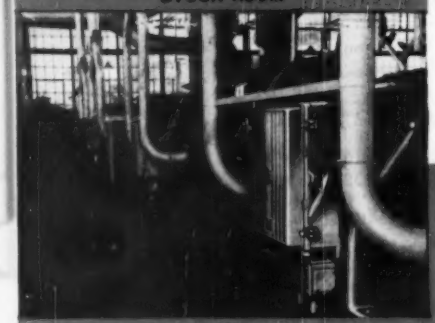
(*See Article 346, Section 3462, National Electrical Code.*)

The **CONDULET** and rigid conduit method meets the requirements of the National Electrical Code in locations exposed to weather, heat, moisture, steam, vapor, dust and dirt or locations that are hazardous because of the possibility of the presence of flammable gases or vapors, or combustible dusts. The same sterling qualities that make **CONDULETS** the first choice in these special applications, make them first choice in **ALL** ordinary locations.

PETROLEUM REFINERY

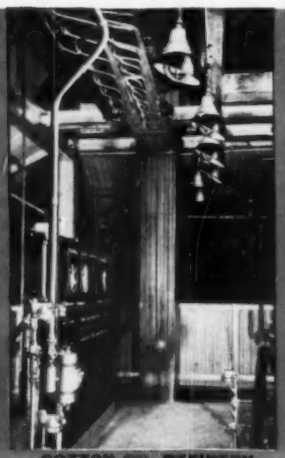


STOCK ROOM

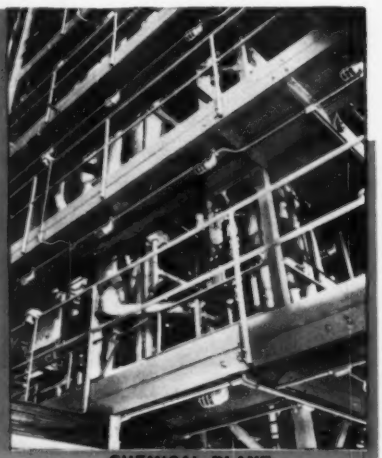


GRINDING ROOM

PAINT SHOP



COTTON OIL REFINERY



CHEMICAL PLANT

*CONDULET is a coined word registered in the U. S. Patent Office. It designates a product made only by the Crouse-Hinds Company.

....the UNIVERSAL wiring method

"for MODERN WIRING . . .

the CONDULET and conduit method

gives you definite advantages"

1 MECHANICAL PROTECTION . . . Rigid conduit and cast Feraloy CONDULETS provide the best possible protection against accidental damage to the wiring and equipment. Prevents costly shutdowns.

2 SAFETY . . . A CONDULET installation gives maximum protection against personal injury and fire. The continuous conduit system made up with taper threaded CONDULETS provides a reliable and permanent low resistance path to ground.

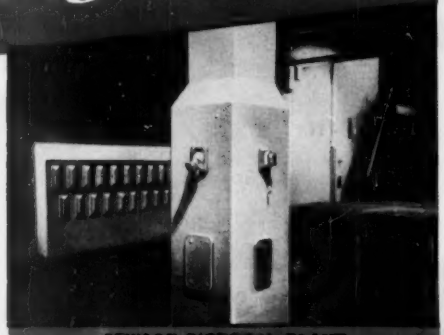
3 FLEXIBILITY . . . To meet all the diverse requirements of modern electrical layouts, CONDULETS are made in a wide variety of shapes and sizes with varied hub arrangements, including a full line of CONDULETS with detachable hub plates.

4 ECONOMY . . . The installed cost compares favorably with other methods, while the total cost over the years is definitely lower, due to the durability, reliability, safety, and low maintenance cost of a CONDULET and rigid conduit system.

5 CORROSION RESISTING . . . Galvanized cast Feraloy CONDULETS offer the best protection wherever moisture, dust or corrosive atmospheres are present.

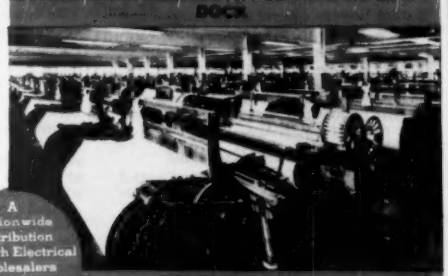
6 QUALITY . . . The trademark CONDULET stands for reliability and long life. Every CONDULET is built to Crouse-Hinds high standard of quality with painstaking care by skilled craftsmen.

On **YOUR** next electrical layout, for any location, plan to get all the benefits of sturdy cast Feraloy CONDULETS and rigid conduit . . . the UNIVERSAL wiring method. More than 15000 types and sizes are listed in the CONDULET Catalog.



SEWAGE DISPOSAL PLANT

DOCK



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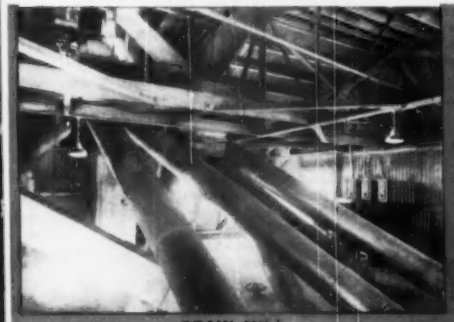
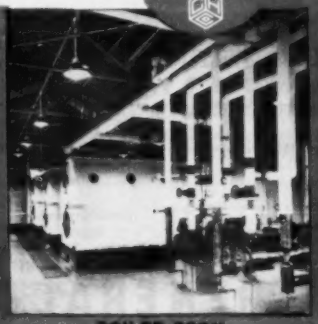
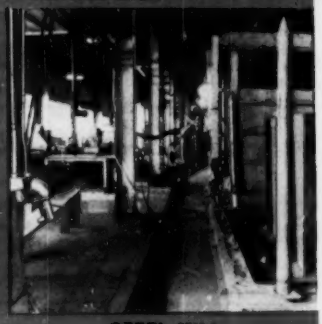


GRAIN MILL



BOILER ROOM



STEEL MILL

WIRING NEWS

A PERIODICAL DIGEST OF WIRING IDEAS FROM THE GENERAL ELECTRIC CONSTRUCTION MATERIALS DEPARTMENT

Master Selector Switch Adds New Remote Control Uses

Have you stopped to consider the amazing versatility added to General Electric's remote-control wiring system by the master selector switch?

Replacing gangs of separate ON and OFF controls, the compact master selector switch, RMS-1, provides instant, positive control of up to nine different circuits.

You'll do well to use it as an added talking point in arousing *even more interest* in remote control. Be sure to show your customers how one or more master selector switches can provide them with advantages such as these:

In Homes and Apartments

Instant bedside control of all interior and exterior lighting . . . an invaluable asset in emergencies. Added convenience through control of kitchen appliance outlets and attic ventilators from several different points. Control of key indoor and outdoor lights from the garage, front door, back door, and bedroom.

In Plants and Factories

Control of fire and alarm circuits. Control of watchman's circuits and provision for pathway lighting on his rounds. Selective control of aisle lights, individual work area lights, outlets, and small electrically-operated machinery from any desired point.

Then too, there are many applications for farms, swimming pools, parking lots, athletic fields, tourist cabins, schools, museums, hospitals — and you can probably think of many more. For further information simply check box (A) below.

New Levelock Switch Box Saves Time and Temper

Neither hammer blows nor construction-site abuse can dislodge the side plates of the new General Electric Levelock switch box. Wedging action of a new locking mechanism locks box parts securely in place — yet is simple enough to permit fast, certain assembly of switch-gangs.

Leveling the box against the studding is also a faster, easier operation. Four contact points — instead of the usual three — prevent tilting or rocking of box during mailing.

In addition to nail-through holes, an extra set of nail holes through the side plates allows speedy gang mounting of the Levelock box direct to studding. Extra side-plate pryouts provide for out-of-the-ordinary installations. All pryouts are easily removed by a quick twist of a screwdriver.

A new single-screw ear adjusts from slightly above to 5/8-inch below the edge of the new Levelock box, while an extra-sturdy bridge across the ear adds increased strength. There's plenty of space, too, within the bridge to accommodate the device strap.

The ingenious construction of General Electric's Levelock switch box makes possible immediate installation savings on either new construction or modernization work. Prove it to yourself — plan to try the new Levelock on your next job, or check box (B) in the coupon for complete information.

New Geotrol Wire Defies Gasoline and Oil Hazards

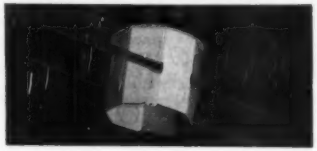
Heavy, lead-sheathed cable is no longer necessary for underground wiring in conduit to gasoline pumps and floodlights at filling stations. General Electric Geotrol (Type TW) wire—resistant to petroleum products—offers new ease of installation at a lower cost.

Refineries and other industrial plants, where lighting and control circuits are exposed to oil or gasoline, can also use Geotrol wire to advantage.

Insulated with time-proved Flamenol*, Geotrol wire has an additional protective jacket that is highly resistant to gasoline, oil, and other hydrocarbons. Specifically developed for installations where gasoline and gasoline vapors are likely to occur, Geotrol wire is listed by Underwriters' Laboratories, Inc. for operation at 30 C under such conditions.

G-E Geotrol wire is lightweight, is easy to pull through conduit, and is manufactured in seven bright colors. Awg sizes 14, 12, and 10 are available. For information, check box (C) in the coupon.

*Registered Trade Mark of General Electric Co.



New Hung Ceiling Box† Speeds Conduit Connections

For fast, easy installation and real savings on jobs using conduit, this new hung ceiling box is hard to beat. Virtually eliminating special couplings and pipe bending operations, this easy-to-handle, eight-sided ceiling box allows conduit to enter the knockout — over the grid structure — from all eight angles. In addition, the lower row of knockouts permits conduit runs parallel to channels.

Four-point suspension of the box is provided by two sturdy mounting bars. With bars in a parallel position, the box slides back and forth for quick, easy centering. When bars are spread slightly, the box locks securely into any desired position for easy wiring.

For long life and protection from corrosion, the new hung ceiling box has been hot-dipped galvanized. For full particulars check box (D) at left.

(†U. S. Patent No. 1,954,481)

Section K13-1118

Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut

- ☐ A—Remote-control Master Switch
- ☐ B—Levelock Switch Box
- ☐ C—Geotrol Type TW Wire
- ☐ D—Hung Ceiling Box

Name _____ Title _____

Company _____

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City _____ Zone _____ State _____

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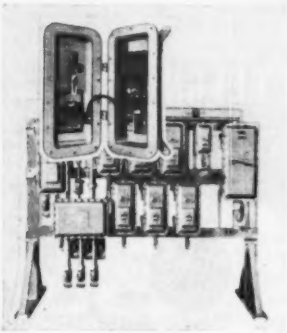
Product News

Cable Heads (1)

Announcement has been made of new service entrance cable heads. They have cast aluminum main bodies with separate covers. Cable clamp is of heavy steel and features a large keyhole for mounting screw. The No. 710 has a minimum cable opening of ⅞ inch by ⅞ inch and a maximum cable opening of 1⅛ inch by 1⅛ inch. Minimum opening of the No. 711 is ⅞ inch by ½ inch with a maximum of ⅞ inch by ⅞ inch. Units are approved by Underwriters Laboratories.

Blackhawk Industries, Dubuque, Iowa

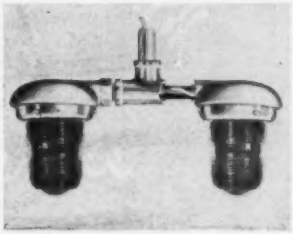


Starters and Controllers (2)

Improved standardized enclosures for across-the-line starters, and starters in combination with circuit breakers are now available. Starters range from Size 0 to 4 inclusive, for use in explosive atmospheres and atmospheres containing excessive amounts of vapors or dust. Some of the features are nonfreezing revolving shaft for operating the pushbutton station and manual reset; rectangular design to allow close grouping of distribution panels with bolted-on cover permitting accessibility for wiring and servicing of interior equipment; extra heavy, separable hinges on combination starter covers to allow opening of enclosures for inspection and maintenance, without removing cover. Conduit connections are on the sides s well as on top and bottom.

Russell & Stoll Co., Inc., 125 Barclay St., New York, N. Y.

(3)

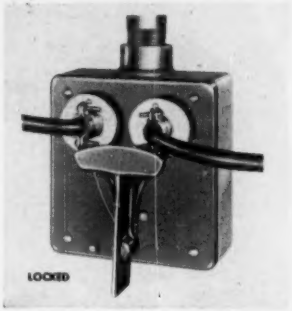


MARKER-OBSTRUCTION light, known as "Telico" has been announced. It is designed for use on upright conduits or masts. Side of the light base incorporates standard ¾ inch internal pipe conduit threads. No elbow connections or other attachments are required to mount the light to a ¾ inch diameter pipe or mast. Light is waterproof and corrosion resisting. A special fresnal type red lense is mounted on top of unit. Manufactured by Dave Rumph Company, P. O. Box 4178, Fort Worth, Texas.

Fastening Tool (4)

Dual action has been added as the principal feature of 14 new improvements in this light duty fastening tool. Dual action offers users a choice of either "turn" or "tap" operation, depending upon varying working conditions. Turn operation is designed for general working conditions. Tap operation has been retained for the many applications which are in confined locations and for those who prefer it. New safety features have been built into the tool. An engineering control makes it impossible to operate at angles greater than 15° between the outer edge of the shield and the work surface.

Ramset Fasteners, Inc., 12117 Berea Road, Cleveland 11, Ohio



Receptacle (5)

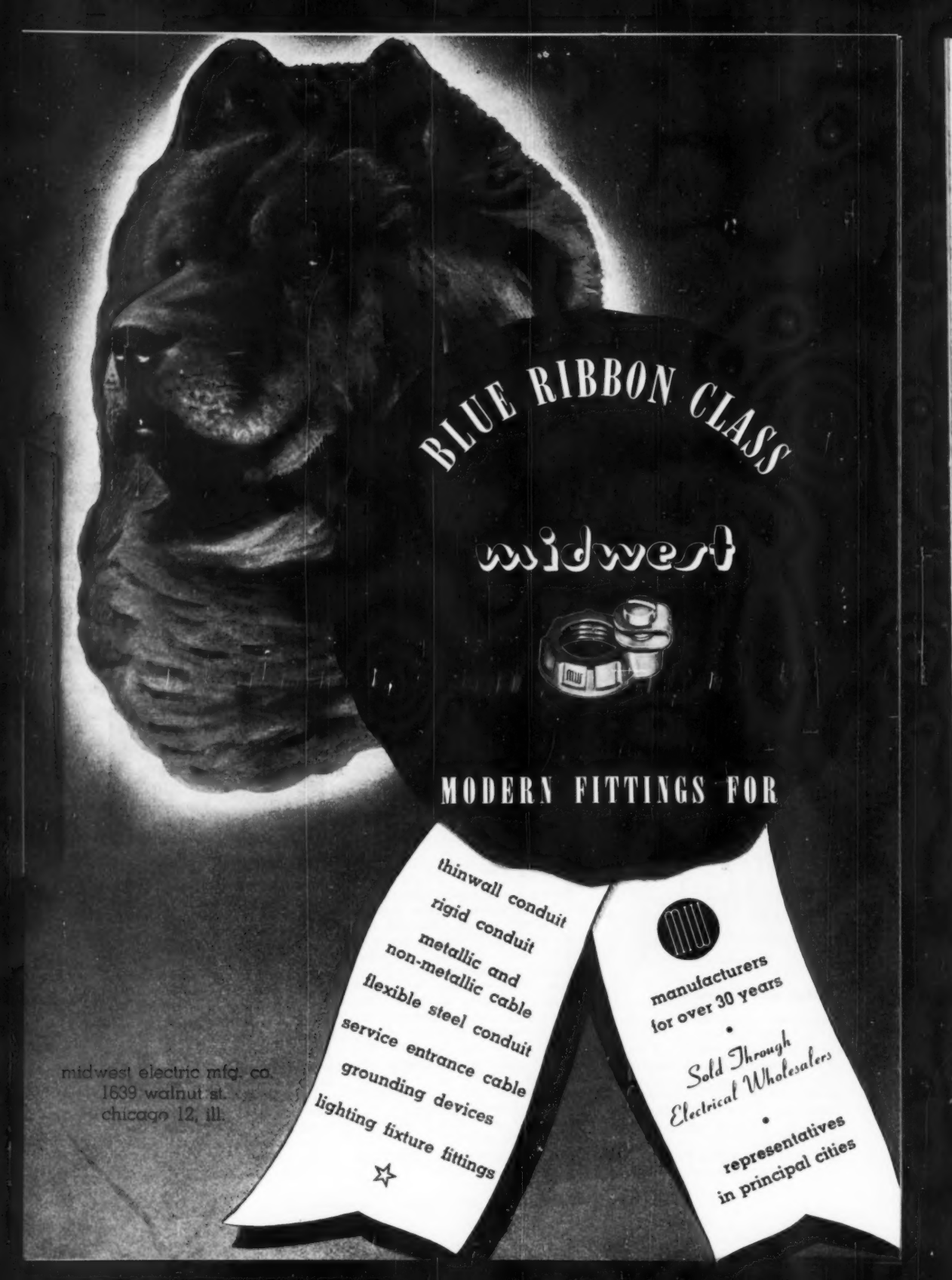
A new interlock receptacle with automatic circuit breaker has been announced. It incorporates a positive, safety cam lever which locks cord caps securely in receptacle. This makes it impossible to remove the cord while current is on. A flip of the lever breaks the circuit while allowing plugs to be removed from sockets. Standard flush type single or duplex receptacles, fitting any conventional cord cap, are used. It is available in capacities up to 20 amperes.

Panellit, Inc., 7218 No. Clark St., Chicago 26, Ill.

Truck Body (6)

A new transit-maintenance body has been added to this line of public utility bodies and equipment. Arranged to permit comfortable transit for four men, in addition to those in truck cab, unit also provides compartment space for carrying a wide variety of tools and materials. The body is useful for surveying crews and maintenance gangs, and for transporting extra tools and men to large construction jobs. Compartments may be equipped with shelves, trays, and bins to meet requirements of any operation. Body roof may be fitted with hand rails, hold-down straps, ladder racks or material brackets.

Powers-American Division, McCabe Power Auto Body Co., 5900 No. Broadway, St. Louis 15, Mo.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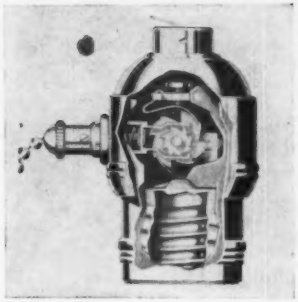
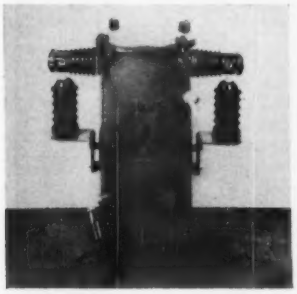
midwest
MODERN FITTINGS FOR
thinwall conduit
rigid conduit
metallic and
non-metallic cable
flexible steel conduit
service entrance cable
grounding devices
lighting fixture fittings
manufacturers
for over 30 years
Sold Through
Electrical Wholesalers
representatives
in principal cities
midwest electric mfg. co.
1639 walnut st.
chicago 12, ill.



Industrial Socket (7)

Announcement has been made of a new Levolier Model 4100 industrial socket. It has double brass wall of cap and casing covering the center section at the lever. These overlapping parts around the mechanism are locked together with a threaded union type collar. The screw shell for the lamp base is of bronze. Rated at 660 watts 250 volts the socket is approved by Underwriters' Laboratories. Available with ⅛ inch pipe thread cap and brushed brass finish.

McGill Manufacturing Co., Inc., Valparaiso, Ind.

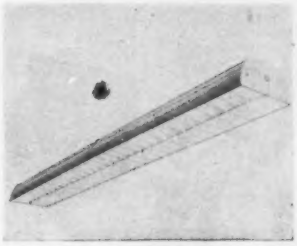


Transformers (8)

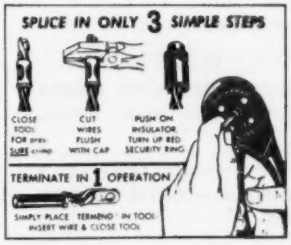
Improved CSP distribution transformers with cylindrical tanks, wall-mounted primary bushings, and externally mounted lightning arresters are available in ratings below 5,000 volts. They are cylindrical with no overhanging hood. Space required on the pole is decreased. The breaker operating handle is mounted between one of the primary bushings and the pole bracket so that the operating handle is accessible without reaching around a primary bushing or arrester. Improved-type lightning arresters are mounted on the outside of the tank. A series air gap isolates the arrester from the line both electrically and mechanically. Radio interference problems are eliminated through use of this gap. High-voltage bushings are mounted directly in the tank walls. A hand-operated insulating knob tightens a mechanical connector which will accommodate from No. 8 solid to No. 2 stranded AWG conductors.

Westinghouse Electric Corp., Pittsburgh 30, Pa.

(9)



FLUORESCENT LUMINARIES, known as "Coronet" series, are for all 4, 5, 6 and 8 foot fluorescent lamps, slimline, low-brightness or starter type. They are designed for use in offices, schools, stores and other commercial interiors. Units are available with either 40° crosswise and 40° lengthwise shielding or 40° crosswise and 25° lengthwise shielding. Manufactured by Curtis Lighting, Inc., 6135 West 65th Street, Chicago 38, Ill.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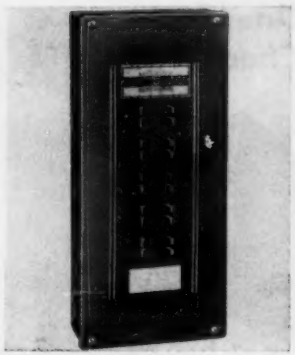
CLOSE TOOL FOR pre-butt crimp
CUT WIRES FLUSH WITH CAP
PUSH ON INSULATOR TURN UP RED SECURITY RING
TERMINATE IN 1 OPERATION
SIMPLY PLACE TERMINAL IN TOOL INSERT WIRE & CLOSE TOOL

Connectors (10)

Splice caps for "pigtail" splicing of electrical wires are now available in an improved open-end construction which facilitates installation and inspection. Open-end splice caps insure that wire insulation is always flush with splice cap for maximum circuit protection and that wires are always inserted to full depth of splice cap. Only two sizes are required for most frequently used combinations of two or more wires ranging from two No. 18 to three No. 8. Snap-on insulators of fixed insulating value eliminate necessity for taping of joints. Approved by both Underwriter's Laboratories, Inc. and Canadian Standards Association.

Buchanan Electrical Products Corp., 1290 Central Ave., Hillside, N. J.



Multi-Breakers (11)

The application of type MO 20 multi-breaker load center with split main bus has been extended. The bus has been segregated in order to allow control of all lighting circuits by a main breaker while other heavier circuits such as range, water heater, dryer and sub-feeds are controlled by parallel main breakers. With this arrangement, a 100 ampere circuit breaker service entrance device is available complying with paragraphs 2351-A and 2371-A-3 of the 1947 National Electrical Code (6-circuit limit). Two variations allow either lighting main with 12 single pole branches and two parallel 3-wire circuits or lighting main with eight single pole branch and four parallel 3-wire circuits. All circuits give two way protection with thermal-magnetic operating mechanism.

Square D Company, 6060 Rivard Street, Detroit 11, Mich.

Instrument (12)

A new cover design which permits shadow-free illumination of instrument scales with conventional room lighting is the feature of a new line of 4¼ inch, long-scale switchboard instruments recently announced. Designated as Types AB-18, ac, and DB-18, dc, they employ a protruding convex-type glass cover that permits the scale to be mounted flush with the front of the instrument case, while providing clearance for moving parts. They are designed for general switchboard service on both large and small equipment, such as control stations, testing devices and other installations where space is limited. 25 of the new instruments can be mounted on a panel 24 inches square. Models include dc ammeters and voltmeters and ac ammeters, voltmeters, wattmeters, frequency meters, power factor meters and synchroscopes.

General Electric Co., Schenectady 5, N. Y.

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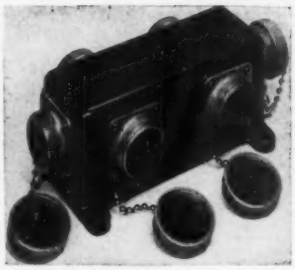
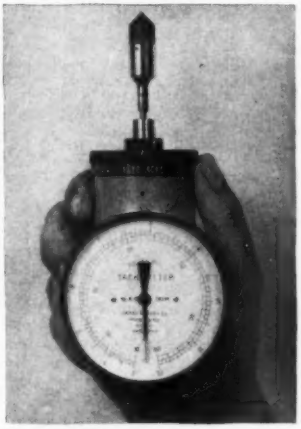


Multiple Outlet **(13)**

Announcement has been made of a new outlet box with five interruption-proof all-weather outlets from one inlet. Greenbilt Type 6005 waterproof outlet box is available for multiple power outlet service in field or building construction; industry, factory and home shops; expositions, fairs, hotels and resorts. When used with accessory connector Types 106 and 115 gives the user dependable waterproof, weatherproof and pull-out proof connections. Inlet Type 106 is rated for 6000 watts and the outlet Type 115 for 1500 watts.

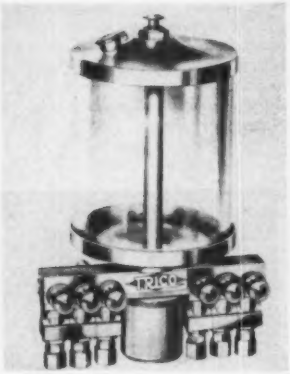
Equipment and Service Company, 6815 Oriole Drive, Dallas 9, Texas.



Instrument **(14)**

Jagabi centrifugal tachometers are now protected with a special clutch device which minimizes the possibility of damage due to the use of a low speed range for a high speed spindle, or from too sudden acceleration. A special form of friction coupling reduces the likelihood of damage due to occasional or unintentional excessive acceleration and overspeeding. Tachometers are available in one, three and five ranges, for speed measurement from 25 rpm up to 48,000 rpm.

James G. Biddle Co., 1316 Arch St., Philadelphia 7, Pa.



Multiple Feed Oiler (15)

A new automatic solenoid or manual control multiple feed oiler has been announced. A centralized system of lubricating 1 to 20 bearing points on machine tools, punch presses, high speed production equipment, automatic machines, conveyors, chains and similar applications. Oil is fed by gravity from large reservoir through individually adjustable needle-valves and through copper or Neoprene tubing to various bearings. When solenoid, located directly below reservoir, is energized, oil feeds to all lines. Stops feeding when current is shut off. Can be operated from any convenient current outlet or connected directly across motor starting switch to feed automatically when starting, or stop feeding when equipment is not in operation. Manual control type has a shut-off lever at top. Solenoids are of standard voltage—115 and 230 volt, 60 cycle—110 and 220 volt, 50 cycle.

Trico Fuse Mfg. Co., 2958 No. 5th Street, Milwaukee 12, Wis.

Wire (16)

A new gasoline- and oil-resistant wire, called Geotrol, has been announced. This wire, listed by Underwriters' Laboratories, Inc., is designed for wiring in conduit to gas pump islands at filling stations and for lighting circuits at refineries and similar places where oil and oil products are likely to cause deterioration of non-resistant wires. Conductors are insulated with vinyl compound and sheathed in a jacket that is highly resistant to petroleum products. The insulated conductors are available in black, white, red, green, orange, blue and yellow. Geotrol is available with solid conductors in sizes 14, 12 and 10AWG.

General Electric Company, Bridgeport 2, Conn.

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FRICTION AND RUBBER

TAPES

MATERIALS — A major factor in the expanding demand for Accurate Tapes. Only finest grade cotton sheeting, purest live rubber are used in their manufacture. Result — permanent pliability, extra stretch, maximum cohesion — all important to clean, fast, economical taping.

WORKMANSHIP — Accurate Friction Tapes are super-calendered for complete impregnation of the base cloth. Careful slitting prevents tape from raveling when used. Accurate Rubber Tapes are specially compounded with unusual precautions taken to maintain caliper, elasticity and fusing characteristics.

QUALITY CONTROL—Every production run must fully meet fourteen exacting quality control checks. These tests guarantee the quality of every roll shipped — are the big reasons why Accurate tapes have increased in popularity every year for over 30 years.

READY NOW!

ACCURATE CATALOG

ACCURATE MFG. COMPANY
Garfield, New Jersey

IF IT'S TAPE... IT WILL PAY YOU TO MAKE SURE IT'S ACCURATE TAPE

FEATURES FLEXIBILITY, LIGHT WEIGHT, CORROSION RESISTANCE, AND EASE OF INSTALLATION

CARLON PLASTIC CONDUIT assures rapid and economical installation because of its flexibility and extreme light weight. Guaranteed against rot, rust, and electrolytic corrosion, this new conduit can be installed in concrete as well as underwater and underground.

CARLON CONDUIT is furnished in lengths up to 400 feet (depending upon diameter), and couplings are available to facilitate connection to junction boxes and other line fittings.

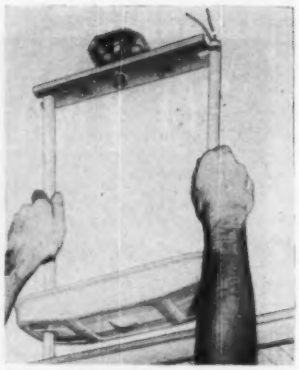
Smooth interior of CARLON plastic conduit permits rapid, easy feeding of wire or cable. In addition, CARLON conduit is an excellent insulator, having a dielectric strength of 500 volts per mil.

CARLON CP LONG LIFE *The first real pipe that is plastic!*

CARTER PRODUCTS CORPORATION

10280 MEECH AVENUE

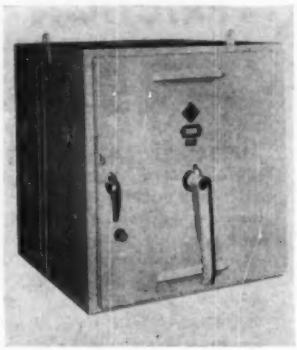
Cleveland 5, Ohio



Hangers (17)

The new U-D-T hangers, recently announced, makes a one man job of hanging fluorescent fixtures. They feature an exclusive stem attachment that will not permit turning, twisting or up and down movement at the ceiling. They provide an adjustment for leveling up to 2¼ inches.

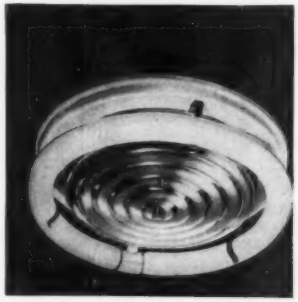
Edwin F. Guth Company, 2615 Washington Ave., St. Louis 3, Mo.



Circuit Breakers (18)

Announcement has been made that Types G-25 and G-50 low voltage air circuit breakers, previously available only as bare breakers or in metal-enclosed switchgear can now be had for individual mounting. The individual, stationary mounted breaker has a sheet steel enclosure formed and welded into a housing that encloses the circuit breaker and cable connections. The front portion of the enclosure is provided with a removable hinged panel, ventilating louvers, latching mechanism and door handle, hasp for locking and necessary flash barriers. Rear portion or cable entrance box can be separated from breaker housing and includes removable cover plates at top, bottom and sides for connection, and cover plates with knockouts for incoming and outgoing cables. Weatherproof units are rubber gasketed and lifting lugs are provided for easy handling.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis.



Lighting Fixture (19)

A new circular fluorescent lighting fixture which starts instantly, for use in kitchen areas, has been announced. Fixture is finished in baked white enamel to blend with ceiling, has a polished aluminum reflector and contains a circular fluorescent lamp, 12 inches in diameter. Unit is easy to install and fits into any type outlet box. Fixture distributes illumination uniformly around the work area and eliminates glare. It is suitable in small kitchens, kitchenettes or dinettes, bathrooms, sewing rooms, and sun porches, or over stairway landings.

Sylvania Electric Products Inc., 500 Fifth Avenue, New York, N. Y.

Smoke Detector (20)

Announcement has been made of a new photoelectric smoke detector for air conditioning duct systems. It is recommended for use in stores, theatres, hotels and other locations where the presence of smoke is a hazard to property or a possible cause of panic. At the first sign of smoke Type A28E operates, and through auxiliary relays may automatically turn off blowers, close automatic shutters and signal maintenance department. It is supplied with light source Type L30R. It is designed for mounting on opposite sides of duct. Among the features of this system are a sensitive photoelectric circuit with fail-safe circuit design and a tamper-proof sensitivity control to prevent unauthorized adjustments. Contact rating is 3 amp, 115 volts ac; 1.5 amp, 230 volts ac; non-inductive.

Photoswitch Incorporated, 77 Broadway, Cambridge 42, Mass.

"I'm clinching rush panelboard jobs with my own basic supply of *Pushmatic*® Electri-Centers!"

1 "I took a tip recently from my local BullDog Distributor and started an emergency Pushmatic stock with several basic Electri-Centers and fronts plus . . .

2 "a few cartons of Pushmatics (they're all the same size, regardless of ratings or types, and fit any Electri-Center, so you don't need too many).

3 "With this supply, I was ready for that rush order yesterday. All I had to do was hook the right Pushmatics on the mounting rib and connect them to bus bars with a screw driver.

4 "Now I'm always sure of having the right equipment on hand and being Johnny-on-the-spot when a rush order comes in. My customers appreciate that fast service, too."

This timesaving plan is paying off every day for Contractors across the country.

Revolutionary Pushmatics are interchangeable for rating and type. And there's a Pushmatic to meet every load condition: THERMAL-MAGNETIC and THERMAL-MAGNETIC with exclusive AMBIENT COMPENSATING FEATURES. Both are identical in size and contour, in ratings of 15, 20, 30, 40 and 50 amperes, 1 pole, 120 V., or 2 poles, 120-240 V., AC.

See your local BullDog Distributor today. He'll be glad to show you how a small emergency supply of flexible Pushmatic Electri-Centers can help you clinch rush panelboard jobs.

Features of sensational Pushmatics!

- Simple to install; plenty of wiring room
- Individual single-pole units . . . easier to add or interchange than multiple units
- Push-button switching
- Positive protection against overloads and short circuits
- Trip-free automatic protection

Approved by Underwriters' Laboratories

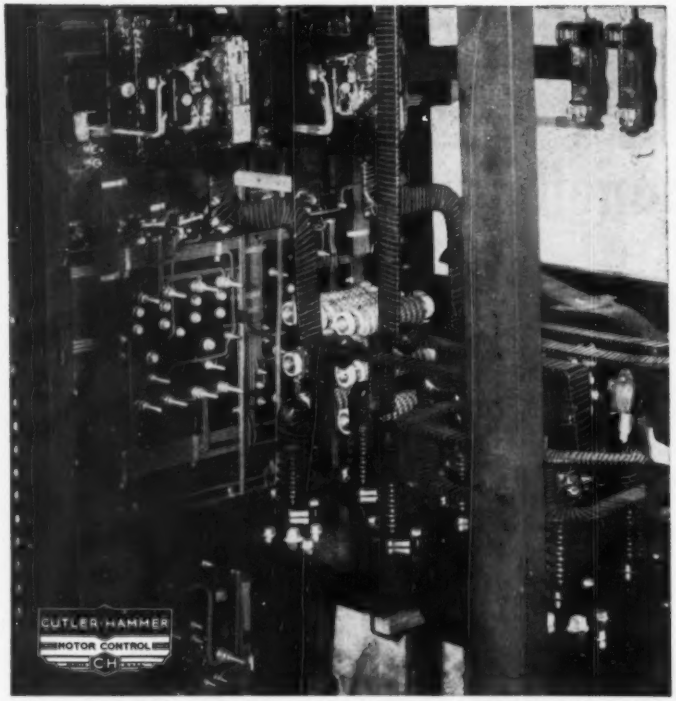
BULLDOG ELECTRIC PRODUCTS COMPANY
DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES
IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO

***PUSH*—It's ON!**
***PUSH*—It's OFF!**
***PUSH*—It's ON again!**

*Push-button switch with automatic protection for electric circuits

BULLDOG

HEADQUARTERS FOR ELECTRICAL DISTRIBUTION



NEAT, COMPACT insulation for Cutler-Hammer rubber mill controller with "Scotch" No. 33 Electrical Tape.

Now! Low-cost protection for high-tension bus bars

Cutler-Hammer mill-duty controllers protected with plastic tape

Mill-duty controllers call for wiring that can take steady punishment—that's why Cutler-Hammer uses "Scotch" No. 33 Electrical Tape. This plastic-backed tape gives "C-H" greater production economy, neater, cleaner results. Bus bar and terminal wrappings on *many* Cutler-Hammer controllers are given dependable protection with plastic tape—a plus feature in products already world famous for quality.

And there are more "Scotch" Electrical Tapes to cut *your* insulation costs, build the quality of your jobs. Write Dept. EC-115 for full information.

Quick Facts about "Scotch" No. 33 Electrical Tape

- TOUGH—plastic backing is abrasion resistant, unaffected by water, oil, alkalies, alcohols.
- HIGH DIELECTRIC—over 10,000 volts.
- THIN CALIPER—only .007 inch thick.
- STRETCHY—conforms to odd surfaces.
- REMEMBER—for permanent high-heat insulation try "Scotch" Electrical Tape No. 27 with glass-cloth backing, thermo-setting adhesive.

SCOTCH BRAND Electrical Tape No. 33

Made in U.S.A. by **MINNESOTA MINING & MFG. CO.**, St. Paul 6, Minn.
Also makers of other "Scotch" Brand Pressure-sensitive Tapes, "Scotch" Sound Recording Tape, "Undercoat" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Abrasives, "3M" Adhesives.
General Export: Durex Abrasives Corp., New Rochelle, N.Y. • *In Canada:* Canadian Durex Abrasives Ltd., Brantford, Ontario

Wire Connector (21)

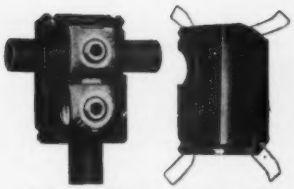
A new set-screw type wire connector has been added to this line. It is listed by Underwriters' Laboratories for 600 volt application and as a pressure cable connector for general use in all branch circuit wiring. It is recommended for use on conduit, armored cable, nonmetallic cable and open wiring. Connector has a high dielectric phenolic shell with an extra-long, extra-strong skirt. This skirt covers the wire insulation. The sleeve and set-screw are solid brass and corrosion proof. The shell can also be removed at any time for periodic inspection of splices.

Ideal Industries, Inc., 1041 *Park Avenue, Sycamore, Ill.*

Regulators (22)

New static type constant current regulators for brightness control of series airport runway and taxiway lights have been announced. They are specifically designed for high speed switching which eliminates any blacking out of runway lights when brightness control is operated. A 4 kw regulator suitable for a primary of 250/240/230/220 volts, 60 cycles, and secondary of 6.6 amperes with taps for 100%, 30% and 10% brightness control. A primary circuit breaker, 3 position high speed brightness control selector snap switch, and four auxiliary circuit breaker switches for obstruction lights, beacons, etc., are mounted on a sloping panel.

Hevi Duty Electric Company, Milwaukee 1, Wis.



XTP as T Tap with cover off

XTP as Parallel Tap with cover on

Cover for Connectors (23)

A new cover for electrical taps, known as Kwi-Cover, has been introduced. It eliminates the necessity for taping on O.Z. solderless connections. They give positive protection to O.Z.'s tee, parallel and two-way connectors. It consists of a high impact strength canvas-bakelite body and cover. Four stainless steel spring fasteners snap down and locks the assembly securely, keeping dirt and damage away from connection. Because they are an integral part of the cover, these fasteners cannot fall off or become mislaid. Available for the XTP, XW, PT and PM group of connectors in this line.

O. Z. Electrical Manufacturing Co., Inc., 262 Bond St., Brooklyn, N. Y.

Amplifier (24)

A new plug-in line amplifier with self-contained power supply, Type MI-12160, is now available for custom sound installations. It is designed for shelf mounting. It can be used as a master mixer for up to four pre-amplifiers, a booster amplifier for supplying zero level to a telephone line, a line amplifier capable of operating from a telephone line, a driver amplifier supplying driving voltage for up to 500 power amplifiers, a monitor amplifier supplying two watts of audio power to a speaker, or a bridging amplifier for bridging a low impedance line. It will provide frequency response from 30 to 15,000 cycles with low distortion. It features inverse feedback control and voltage-regulated power supply, and has a rated power output of up to two watts. Amplifier operates from a 105-125 volt, 56-60 cycle ac power supply. Normal consumption is 75 watts. Unit is 5½ inches wide, 13 inches deep, and 6⅞ inches high.

RCA Engineering Products Department, Camden, N. J.

They Did It With DRIVE-IT!

● Here's another typical money-saving fastening triumph for DRIVE-IT—fastening seat brackets at the Grand Rapids Speedrome.

Wherever steel or wood must be fastened to concrete, steel or other hard materials there's a spot for DRIVE-IT to save you money. Reports of 75% to 85% savings over old-fashioned methods are common. With Drive-It, a drive-pin plus a power charge does the job in a split-second—and *better* than the old "dig and drill" method.

We can't begin to tell you the whole story here, but do yourself a favor and send us the coupon below. It will be money in *your pocket!*

Distributors Coast to Coast
POWDER POWER TOOL CORPORATION
0702 S. W. Woods St., Portland 1, Oregon
(Canadian Distributor:) Ammo Power Tool Co., Ltd.
Foot of McLean Drive, Vancouver, B. C.
ONLY THE DRIVE-IT "300" GIVES YOU ALL THESE FEATURES
☑ Controlled power with one power charge
☑ Positive, 3-way safety
☑ Uses flangeless drive-pins
☑ Permanent, adjustable safety pad
☑ Semi-silent operation
☑ Automatic extension barrel
... and remember: for heavy fastening jobs it's the DRIVE-IT "238"
DRIVE-IT "300"
DRIVE-IT "300"
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Get the full story on DRIVE-IT
Name
Company
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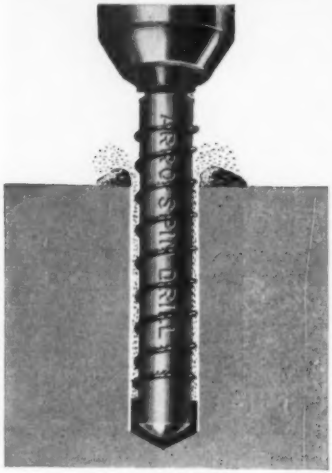
City Zone State
POWDER-POWER TOOL CORPORATION, 0702 S. W. WOODS STREET, PORTLAND 1, OREGON

TRADE ARRO MARK

Flexo-Flute

SPIN DRILLS

FOR ALL MASONRY



- CLEANS DUST FROM HOLES AUTOMATICALLY
- DRILLS FULL DEPTH WITHOUT STOPPING
- MAKES FASTER CLEANER CUTS

Low-angle flexible spring "pops" drill cuttings out of hole automatically. Drills full depth without removing drill . . . no packing or binding. Genuine Carboloy Cemented Carbide tip.

OTHER ARRO PRODUCTS

MACHINE SCREW ANCHORS 6-32—¾"

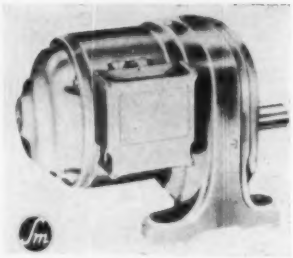
STUD BOLT ANCHORS ¼" x 1-½" ½" x 6"

WING-TYPE TOGGLE BOLTS

SOLD ONLY THROUGH JOBBERS

ARRO EXPANSION BOLT CO.

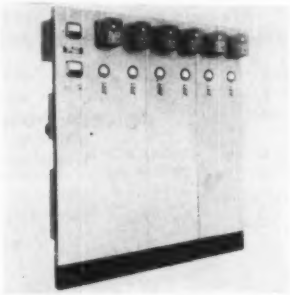
MARION, OHIO



Drives (25)

Slo-speed geared electric power drives are now available in the single phase, capacitor type design. These new single phase gear-head motors are built with single or double reduction gears, providing speeds from 780 rpm down to 30 rpm, in ratings ½ hp to 3 hp incl. They utilize a newly designed starting relay that eliminates the necessity of centrifugal switches or any rotating devices such as throw out switches, commutators, brushes, etc. In addition, these motors retain all other features of the two and three phase "Klosd" protected drip-proof motors, such as one piece cast iron stator frame, "Herringbone" rotor, and Vinol-acetal-insulated wire stator windings.

Sterling Electric Motors, Inc., Telegraph Rd. at Atlantic Blvd., Los Angeles 22, Calif.



Chargers (26)

"Unitized" multiple-circuit battery charging of driver-ride electric trucks, with a new charger, consisting of a motor-generator and a generator control panel and one or more battery charging panels, has been announced. They are available in units of 2, 3, 4, or more circuits, and additional charging panels can be added at any time to increase the service factor up to the capacity of the motor generator—150 kw. Unitized switchboard has a dead front with no protruding cabinet enclosures or exposed electrical parts. All controls are pushbutton operated and mounted at eye level. Ammeters, voltmeter and automatic cut-off devices are visible on front of control panel. Generator field rheostat and all live parts are mounted on back of switchboard. Complete equipment consists of a motor-generator set, unitized switchboard and a magnetic motor starter.

The Hertner Electric Company, 12690 Elmwood Ave., Cleveland 11, Ohio.

Instrument (27)

A new instrument for electrical testing of insulating materials, the current limited high-potential tester, has been announced. It is designed to aid electrical manufacturing plants and service shops in testing insulation of electrical components and assemblies such as coils, relays, motors and appliances. The indicating instrument reads the voltage across the equipment being tested and the measurement is not affected by impedance drops in the internal circuit of the tester. Overloading the tester does not cause errors in the measurement of applied voltage and does not damage tester. It is enclosed in a metal cabinet with carrying handle. It operates on 105 to 125 volts ac of 60 cycles. It is available in either single or dual range models.

General Electric Co., Schenectady 5, N. Y.

Color Lighting (28)

A new method of automatically changing and blending color lighting has been introduced. The color system is known as Rollocolor. In its light mixing operation it uses controls which resemble those of a radio except that colors rather than stations are tuned in. Over 500 combinations of colors are possible under each installation. Some of the use for this color lighting system are department stores, automobile show rooms, large office buildings, hotels, retail stores, restaurants, night clubs, theatres, churches, window displays.

Color Lighting Corp., 100 Vanderbilt Ave., New York 17, N. Y.

New "PLUG-IN" MULTI-BREAKER NMO PANELETTE

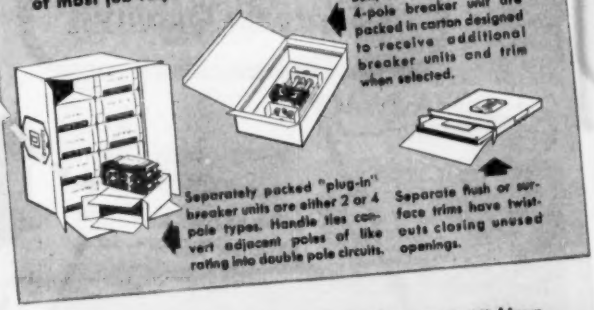
Cutaway showing circular bus bar onto which breaker units are plugged. Twist-outs close openings provided for future use.

"OFF-THE-SHELF" companion to the popular NMO Panelboard, the low cost Panelette meets most A.C. lighting and appliance circuit SWITCHING and PROTECTION requirements. Standardized components stocked by authorized Square D Distributors everywhere.

Construction. Box only 12" W x 4½" D, yet easy to wire . . . door with locks . . . lugs only from 4 to 28 circuits or circuit breaker mains from 4 to 20 circuits . . . 1ø, 3 wire or 3ø, 4 wire . . . flush or surface . . . 15, 20, 30, 40 or 50 Ampere "Plug-In" units interchangeable with NMO Panelboard and MO 12 or MO 20 load centers.

START WITH 4 . . . ADD MORE

Small Stock of Standardized Components takes care of most job requirements



Box, bus structure and one 4-pole breaker unit are packed in carton designed to receive additional breaker units and trim when selected.

Separately packed "plug-in" breaker units are either 2 or 4 pole types. Handle ties convert adjacent poles of like rating into double pole circuits.

Separate flush or surface trims have twist-outs closing unused openings.

Coilless THERMAL-MAGNETIC BREAKER UNITS GIVE 2-WAY PROTECTION

Thermal Element responds to heating effects of both load current and surrounding atmosphere. Total temperature is limited to a safe value.

Magnetic Element responds instantly to heavy overloads or shorts.

***Both* Elements are needed for *complete* protection!**

***Write* for Bulletin 1600, Square D Company, 6060 Rivard Street, Detroit 11, Michigan**

SQUARE D COMPANY

DETROIT · MILWAUKEE · LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

FULLMAN Latrobe PRODUCTS

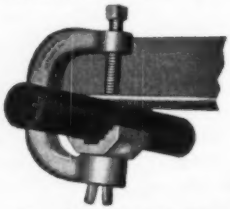
FLOOR BOXES WIRING SPECIALTIES

QUALITY AT LATROBE OBSUPREMACY — FULLMAN MANUFACTURING CO. LATROBE, PA.

BUILT TO SERVE

"Latrobe" Floor Boxes and Wiring Specialties are built for quick, easy installation and long, dependable service.

The neat, clean-cut design of "Latrobe" Products has made them favorites from coast to coast.



No. 470 "Bull Dog" Pipe or Conduit Hangar

No. 110 "Latrobe" Watertight Floor Box

No. 280 Nozzle

No. 200 Cover Plate

Fullman "LATROBE" PRODUCTS *Supreme Quality*

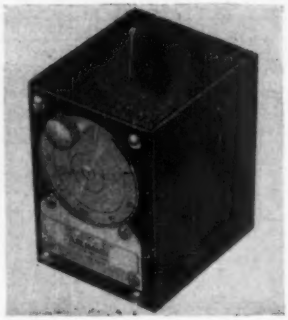
No. 330 Tom Thumb Utility Outlet

"Bull Dog" BX Cable Staples

No. 150 Box— No. 207 Nozzle

Sold Only Through Wholesalers

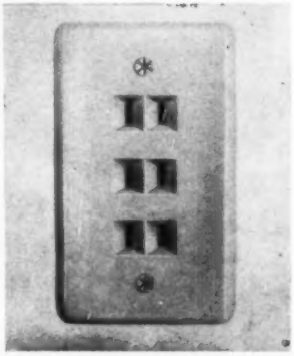
FULLMAN MANUFACTURING CO.
LATROBE . . . PENNSYLVANIA



Adjustable Dial **(29)**

New adjustable dials are now available for Haydon time delay relays. They are especially useful for applications necessitating frequent change of time settings. The time can be changed easily, but once set, it is locked. Flexibility of design allows for addition of radio interference filtering and a governed motor on dc models. Clutch holding contacts for a pushbutton start can be supplied on either ac or dc models. These relays are available for surface or flush type mounting for almost every installation.

A. W. Haydon Company, Waterbury, Conn.



Outlet Combinations **(30)**

Two new triple outlet and plate combinations have been added to this remote-control wiring line. They are of molded, one-piece ivory plastic construction and take less box space, consequently there is more room for wires. Designed to match the switch plates already in the remote-control line, these outlets are equally suitable for conventional wiring installations. Cat. No. RO-1 outlet has common feed and common ground, and Cat. No. RO-2 has separate feed and common ground. Separate feed for the RO-2 permits control of one or two outlets by switches while the remaining out-

let or outlets remain live. Both combination outlets are listed by the Underwriters Laboratories, Inc., and are rated for 15 amp, 125 volts; and 10 amp, 250 volts.

General Electric Company, Bridgeport 2, Conn.

Truck (31)

This new Service-Master is designed to carry a workshop to the job site, completely equipped and prepared for any emergency. It is available in models for ½, ¾, 1 and 1½ ton truck chassis. Compartments are fitted with shelves, trays, and bins to facilitate orderly and accessible storage of all needed tools and parts. Triple-seal compartment doors, which may be locked, provide protection against weather and theft. Bodies may be equipped with a telescopic roof for additional closed storage space. Optional equipment includes roof, ladder racks, pipe racks, vise bracket, and heavy duty rear bumper-step.

McCabe-Powers Auto Body Co., 5900 No. Broadway, St. Louis, Mo.

Control Station (32)

A new 12-unit enclosure has been added to this line of Oil-Tite control stations. The Class 15-022, Type OT pushbuttons, designed for machine tool control and other heavy-duty installations, are now available in control stations accommodating any desired combination of 1, 2, 3, 4, 6, 9 and 12 units. A resilient cork-neoprene gasket provides a seal against oil, coolant, cutting compound, and water. Five types of operator heads, with matching pilot lights, provide for unit flexibility. Maximum interrupting capacity is 12 amps at 600 volts ac, 60 amps at 110 volts ac. Terminals on contact blocks are reversible for front or rear connection. Contact blocks can be mounted in base, eliminating flexible leads from base to cover.

Westinghouse Electric Corp., Pittsburgh 30, Pa

RAWLPLUG

is the trade name of ONLY the ORIGINAL and GENUINE! All others are imitations*

The word "RAWLPLUG" used in connection with *Jute Fibre Screw Anchors* is exclusively the property of The Rawlplug Company, Inc. For forty years it has been secured to them by common law and by trade mark registry. It is the corporate and trade name of the company and specific product of their manufacture.

*Substitutes CAN PROVE DANGEROUS!

Buy—Stock—Sell and Use *Only* the Original and Genuine RAWLPLUGS . . . There are many imitations . . . so look for the trade mark "Rawlplug" on the Blue Box.

THE RAWLPLUG LINE

RAWL-DRIVES
Bolt and Anchor in one piece—drives like a nail into a drilled hole and holds like a bolt. Used only in hard materials, such as concrete, brick, etc.

RAWL-TAPERS
For machine screws. A Machine Screw Anchor that fits the hole drilled, either by a new or worn drill.

RAWL HAMMER-SETS
Heavy duty threaded type machine bolt anchor, ideal for bottomless holes, hard floor topping.

RAWL-ANCHORS
For holding bolts permanently in materials such as concrete, marble, stone, brick, etc. Heavy duty type.

RAWLDRILLS
The original 3-point drill for drilling holes in all masonry. Quickly and easily sharpened. For hand and power drilling. Also Rawl Carbide Tipped Drills for use in electric drills sizes 5/16" to 1½".

IF YOU DON'T USE RAWLPLUGS . . . THERE'S A SCREW LOOSE SOMEWHERE

12K16 For Further Information Write Dept. E

THE RAWLPLUG CO., INC.
271 Church Street, New York 13, New York
SOLD THROUGH ALL LEADING HARDWARE ELECTRICAL AND MILL SUPPLY HOUSES

"WOULD NOT SELL IT FOR TWICE THE PURCHASE PRICE"

Says Walter G. Kolb, President, Kolb Electric, Washington, D. C., of his first Up-Right Scaffold.

ONLY Mobile Aluminum Alloy "UP-RIGHT" SCAFFOLDS have

BUILT-IN LEGS . . . INSTANTLY ADJUSTABLE

for rapid leveling on uneven floors or on stairways. Eliminates the cost of tedious screw leveling.

PLUS OTHER

MOBILE TOWER SCAFFOLDS up to 45' or higher assembled in 1 to 15 minutes.

EXCLUSIVE FEATURES That save time & increase profits

1. Patented one-piece sections—no separate frames. Each section folds flat. No wrenches, wing nuts, bolts or loose parts.
2. Patented casters lock swivel and wheel as one.
3. Welded construction provides greater strength and safety.
4. One man assembly—each aluminum alloy section can be carried and assembled easily and safely by one man.

MOBILE TOWER SCAFFOLDS in desired number of 6' or shorter section units.

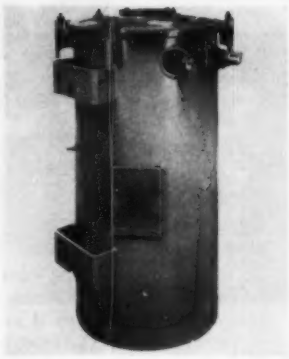
WRITE for Descriptive Circular

Before buying scaffolds insist on a demonstration—then buy the best—the one and only

"UP-RIGHT" SCAFFOLDS

Dept. 107, 1013 PARDEE ST. • BERKELEY, CAL.
Factories: BERKELEY, CALIF., & TETERBORO, N. J.

OFFICES IN ALL PRINCIPAL CITIES



Regulator (33)

A new static type constant current regulator has been announced. This unit transforms constant potential to constant current for control of series lighting for streets, subways, highways and airports. Capacitors, current transformer, reactor and tap switch form a compact unit. The pole type is constructed of steel plate. Several types of switching apparatus may be used. Combination control and protective switch is available for use in static type regulator. Switch is of the air break type. A manually reset protective relay incorporated in the switch de-energizes the regulator if an open circuit occurs in the series loop. Switch may be used with either manual, time clock, electric eye, or other control.

Hevi Duty Electric Company, Milwaukee 1, Wis.

Fire Alarm Box (34)

Announcement has been made of a new "electric trip" fire alarm box which may be automatically actuated by the operation of rate-of-rise or fixed-temperature thermostats, or manually tripped by breaking the glass. This box, termed the "MA-ET", is especially recommended for industrial plants, hotels, hospitals, etc., where several circuits of thermostats are used for automatic fire detection in hazardous areas. One box is used for each circuit of thermostats. When box is tripped, either automatically or manually, four complete rounds of coded alarms are transmitted through audible signals of system. Box is furnished for either surface or semi-flush mounting. It is approved by Underwriters' Laboratories and Factory Mutuals.

The Autocall Company, Shelby, Ohio

Intercommunication (35)

A new series of intercommunicating telephones known as "Idealfones", has been announced. One of the systems is an arrangement for "executive-secretary" telephone service (Type 4), which consists of a plastic speaker cabinet for executive's desk connected to a handset for secretary's desk. It uses a new scientific principle to provide adequate speaker volume and sensitive microphone facilities for executive's office without need for either vacuum tube amplifier or "talk-listen" key. Other systems employ plastic handset telephones which are adaptable to either desk or wall use, and which use pushbutton signalling and a single metallic talking circuit. They serve two to eight stations on a code ringing, selective ringing, or master station basis.

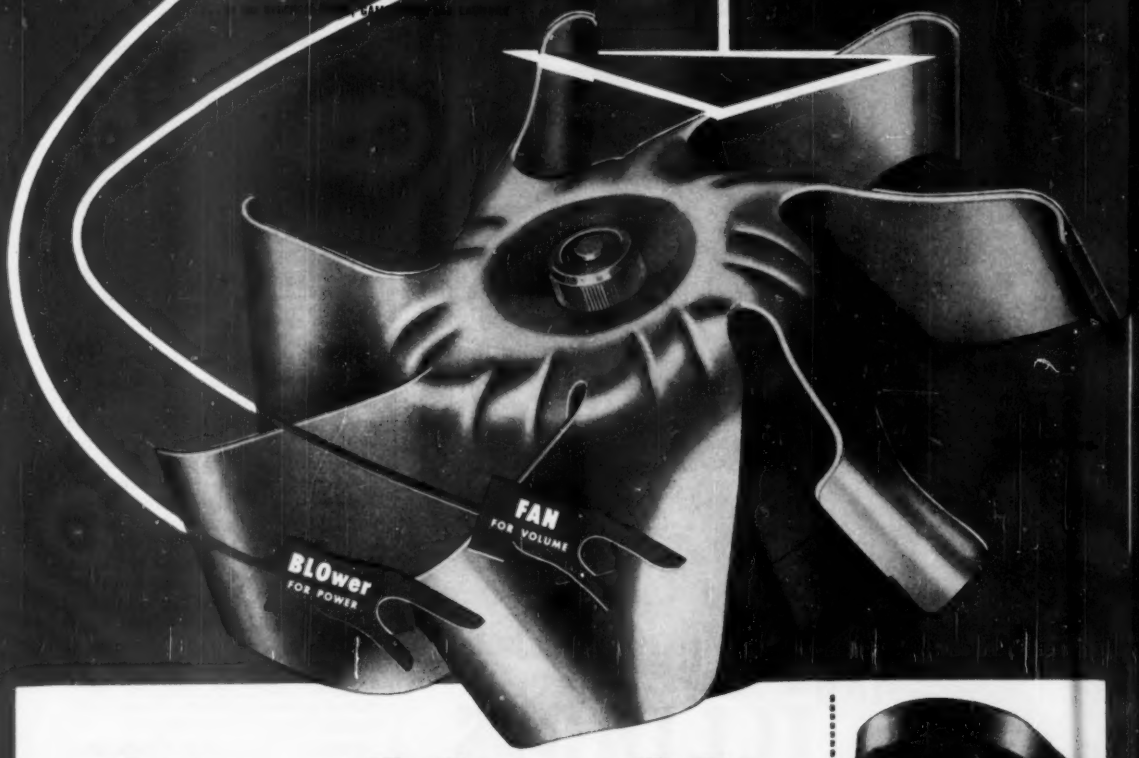
Automatic Electric Sales Corporation, 1033 West Van Buren St., Chicago 7, Ill.

Speed Reducer (36)

A new Heliocentric speed reducer, designed to save cost and conserve space in all in-line reducer applications in the ¼ to 1 hp range, has been announced. Designated as Model 5-E, it is suitable for any straight-line installation in which the input rpm

Blo-Fan*

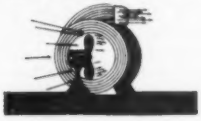
In ventilation- "THE BLADE'S THE THING"



Blo-Fan

REALLY MOVES AIR

The Blo-Fan blade is designed so that the fan element literally scoops up the air, keeping the blower element supercharged at all times. This patented design combines the volume of a breeze fan and the power of a blower to expel more air quickly, quietly and with greater efficiency.



Blo-Fan

IS EASY TO REGULATE

This NINE-speed switch is an exclusive feature on Blo-Fan Model 210... At low to medium speeds, Blo-Fan will easily handle the normal volume of steam and fumes, but in emergencies (like burning the toast) a higher speed will clear the room immediately.

Blo-Fan

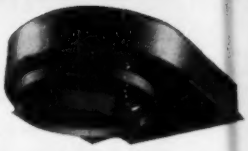
IS EASY TO CLEAN

NO TOOLS ARE EVER REQUIRED. Both grille and motor assembly are removed easily in less than a minute for cleaning and washing. Just unscrew the center cap.

Blo-Fan

PAYS FOR ITSELF

Savings on soap, detergents and cleaning compounds will pay for Blo-Fan in a short time—not to mention the savings on redecorating costs, elimination of back-breaking work, housemaid's knee and calloused hands!



The entire unit fits flush with the finished ceiling or wall.

The motor is rubber mounted to insure quiet operation.

Only the attractive, chrome-finished grille is visible.

Blo-Fan* AMERICA'S MOST IMITATED HOME VENTILATOR

PORCELAIN WIREHOLDER INSULATORS

SPECIFY ILLINOIS PORCELAIN

MADE RIGHT BY

ILLINOIS

Illinois dry process wireholder insulators are uniformly made to meet exact specifications in sufficient styles and sizes for all requirements. Smooth, rounded surfaces protect wire insulation—deep, sharp screw threads assure easy and firm installation. Non-shrinking metal alloy binds screws permanently to insulators. Steel screws are evenly coated by special galvanizing process to prevent rust streaks on sides of buildings. Wet process porcelain supplied for primary circuits.

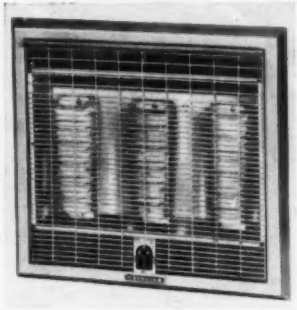
- *HIGH MECHANICAL STRENGTH*
- *HIGH DIELECTRIC STRENGTH*
- *EXACT DIMENSIONS AND UNIFORMITY*

ILLINOIS ELECTRIC PORCELAIN CO.

MACOMB, ILLINOIS

does not exceed 1800. Maximum torque capacity is 1000 inch-pounds. Overall design is compact and streamlined. Features include the use of anti-friction ball bearings and quiet operation.

Universal Gear Corporation, 19th and Martindale, Indianapolis 7, Ind.



Heaters (37)

Announcement has been made of new wall insert automatic electric heaters in four sizes—1500, 2000, 3000 and 4000 watt. They feature new tapered cone construction, which is made of a Cordierite ceramic resistant to heat shock. It cannot rust, corrode or deteriorate. Heating element is nickel-chrome resistance wire. Grille lifts out for cleaning. Deflector is hinged at bottom. Combined switch and thermostat control is built into heater. A curved top deflector throws heat away from wall and circulates air outward into room. Enamelled grille, top reflector and frame are finished in baked enamel of neutral brown. Heaters can be installed under windows.

Cavalier Corporation, Chattanooga 2, Tenn.

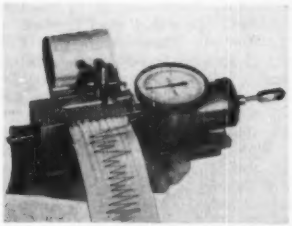
Lamp Changer (38)

Announcement has been made of a new lamp changer. Slimline and fluorescent lamps and starters can be replaced in open type fixtures having accessible, standard lampholders, up as high as 22 feet. With one size head, they can replace incandescent lamps from 10 watts on up, including PAR 38 and R-40. The slimline changer is a sponge rubber lined clamp which can be opened or closed by rotating the handle. Lamp is removed by securing the clamp on the lamp and drawing the cord toward the spring loaded socket until the lamp leaves the other socket. By reversing this process lamp is replaced. T-12 and T-17 fluorescent changer is comprised of a spring clamp inside of which is a rubber roller. On the other end of handle is starter changer. Starters are removed and

replaced in one operation by means of a trip which grips the old starter and leaves the new one in place to be inserted into socket.

Stueland Manufacturing Co., 3502 N. Clark St., Chicago 13, Ill.

(39)



NEW SPEED INDICATING and recording instruments have been announced. The improved hand tachographs and tachometers have 3 inch dial, single spindle, quintuple selective range, with rotating gear shaft. They are made in two different range combinations for speeds 30-48000 rpm, 15-240000 rpm. Tachographs draw graphic charts of speeds on a travelling paper strip. The instruments are manufactured by O. Zernickow Company, 15 Park Row, New York 7, N. Y.

Product Briefs

(40) Radiant Lamp Corp., Newark, N. J. has announced new industrial R-60 weatherproof **floodlight lamps**, called Hi-Flood. . . . (41) General Electric Company, Bridgeport, Conn., has completely redesigned its **garbage disposer**. . . . (42) A new **hand tool** named Impakdriver, has been introduced by H. K. Porter, Inc., Somerville, Mass.

(43) Two new **bins** developed for stock rooms or sales department to provide an accessible unit for frequently used springs, nuts, bolts, washers, clips and other small parts is available from Service Parts Systems, Detroit, Mich. . . . (44) A new **sealing compound** for threaded joints and gasket surfaces known as Leak Lock has been introduced by the Highside Chemicals Company, Clifton, N. J. . . . (45) The Stalwart Rubber Company, Bedford, Ohio, has announced new **Silicone** 161 is now available in rubber parts.

(46) Roy C. Stove and Company, Chicago, Ill. has developed a new electronic **air purifier**, known as Air-Tron, that generates short wave ultra-violet rays. . . . (47) An improved design of fractional-horsepower **dynamometer set** for small-machine and

EXTRA FAST, EASY

Pipe Reaming

ON 1/8" TO 3" PIPE

And RIDGID LonGrip Reamers Won't Flare or Split Pipe

• It's the extra-long-taper on RIDGID LonGrip reamer that makes it smooth the burr cleanly out of pipe or conduit almost without effort. Just a few light ratcheted strokes and your job's done—no worry about thinning, flaring or splitting. Saves your time, work and *pipe*. Furnished complete with ratchet handle, or No. 2 reamer unit sold separately for use in RIDGID OOR small ratchet die handle. Two sizes, No. 2, 1/8" to 2"; No. 3, 3/8" to 3". Ask your Supply House.

RIDGID

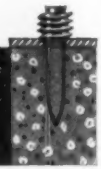
WORK-SAVER PIPE TOOLS

THE RIDGE TOOL CO. • ELYRIA, OHIO

At no cost to you, we'll do an actual fastening job for you, in steel, concrete, other building materials, with RAMSET DUAL-ACTION Fastening Tool . . . the only powder-actuated tool that offers this *dual choice* of TURN . . . or TAP . . . operation for easier, faster fastening in more locations.

We'll show you how DUAL-ACTION has more built-in stability than ever before. We'll prove also, the extra utility, extra economy of RAMSET DUAL-ACTION. Long life and dependability, too, come from precision-built, hardened steel parts, that resist continuous wear and corrosion.

With varying strengths of powder charges to insure correct penetration, with widest range of steel drive pins and threaded studs, and with DUAL-ACTION, you'll save time, work, money. Call your local RAMSET Specialist or write us for free sample demonstration. RAMSET FASTENERS, INC., *12117 Berea Road, Cleveland 11, Ohio.*



Ramset Fastening System
Pioneer in powder-actuated fastening

appliance manufacturers use has been announced by the General Electric Company, Schenectady, N. Y. . . . (48) All-Weather Springs, New York City, has recently developed a tension **tester** for testing tensions or pressures in instruments, etc.

(49) A new, gear-driven **saw attachment** for ½ inch drills has been announced by Federal Engineering Company, New York 7, N. Y. . . . (50) New torch lines announced by Otto Bernz Co., Rochester, N. Y. include aluminum, brass and steel **torches**. . . (51) Beverly Shear Mfg. Co., Chicago, has introduced a new **slitting shear.**

(52) RCA Tube Department, Camden, N. J. has announced a new 15-inch duo-cone **loudspeaker** designed for high-quality reproduction at both high and low-power levels. . . . (53) MLT 32 step voltage **regulators** have been redesigned by General Electric Company, Schenectady, N. Y. . . . (54) Irvington Varnish & Insulator Co., Irvington, N. J. has introduced a new No. 32 red oilproof **enamel.**

(55) A new self-polishing **floor finish,** certified anti-slip by Underwriters Laboratories, Inc. has been announced by R. M. Hollingshead Corp., Camden, N. J. . . . (56) A new **safety guard** and guide, called Edison Lok-Gyde, which prevents fluorescent lamps from falling, has been announced by Koehler-Bird Associates, Boston, Mass. . . . (57) J. S. McConville Co., Attleboro, Mass., has introduced a new Jiffy **cable splitter,** designed especially for splitting the fabric and rubber outer insulation of series street lighting cable and other similar types.

(58) Baldor Electric Co., St. Louis, Mo., has announced the development of a new 600 Series **grinder** in ¼ and 1/3 hp sizes. . . . (59) McLarty Systems, Battle Creek, Mich., has introduced a new cold air booster **fan** for hot or cold air pipes. . . . (60) Nonwatertight **connectors,** Nos. 410 and 411, manufactured by Blackhawk Industries, Dubuque, Iowa, have steel locknut and cable clamps.

CATALOGS and BULLETINS

(61) ELECTRIFUGAL PUMPS, close-coupled with single shaft in unit-cast frame and totally-enclosed fan-cooled or explosion-proof enclosures are discussed in bulletin 52B6140B. Allis-Chalmers Manufacturing Co.

(62) SOLDERING INFORMATION for TV and radio technicians and electricians is contained in catalog giving descriptions and list prices of both heavy and light-duty soldering guns. Weller Electric Corp.

(63) PRESSURE CONTROLS, float switches, timers, alarm panels and accessories are priced in bulletin CP3. Automatic Control Co.

(64) LIGHTING for classrooms, offices and public buildings, with the aid of louvered fluorescent fixtures and/or luminous lens ceilings, is subject of two bulletins published by Litecontrol Corp.

(65) VINYL COATED TUBINGS and sleevings are discussed in terms of flexibility, application, baking cycles and purchasing information, in pamphlet. Insulation Manufacturers Corp.

(66) COLD CATHODE lighting, with advantages, applications, typical installations and variety of available equipment, is presented in 2-color pamphlet. Colonial Electric Products, Inc.

(67) OIL CIRCUIT BREAKER design and construction features for 69-kv ratings up to 3½ million kva interrupting capacities are subject of bulletin 7.B7045. Allis-Chalmers Mfg. Co.

(68) TROFFERS, using louvers and lenses of various shapes and characteristics are sketched and specified in AIA file 31-F2. Gruber Brothers, Inc.

(69) RADIO CATALOG for 1951, including "everything in industrial electronics, TV and radio", is available from Allied Radio.

(70) RECEIVING TUBE manual, containing over 300 pages of information on tubes, kinescopes, theory, formulas and examples for computing required data, is released by RCA Victor.

(71) TUNGSTEN ELECTRODES for atomic hydrogen, helium and argon arc welding are discussed in bulletin 100 with practical hints. Sylvania Electric Products Inc.

(72) CAR LIGHTING and air conditioning batteries are discussed with exploded views of internal construction, specification and discharge curves. Gould-National Batteries, Inc.

(73) EXTERIOR LANTERNS for churches, hospitals, hotels, institutions, public buildings and schools are pictured and priced in folio L50. Gruber Brothers, Inc.

(74) POWER EQUIPMENT used with generation, distribution and control installations, including the fields of voltage regulators, switchgear, motor panels, transformers, substations, circuit breakers and regulators, is subject of bulletin 25B6150C. Allis-Chalmers Mfg. Co.

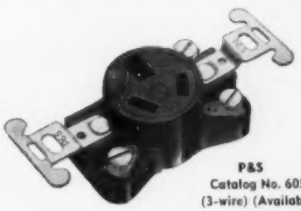
"He's betting it'll take two hours to install this one."

P.S. That mouse will lose his shirt if you're using P&S devices! For P&S devices are easy to install. With P&S quality, dependability and easy installation, you've got a winner every time!

P&S

P & S polarized outlets are stronger, P & S last longer

Outlets in this matched line have sturdy all-bakelite bodies with ⅛" minimum wall thickness . . . rugged terminals . . . No. 8 binding screws have large heads, and take No. 10 wire easily . . . husky, long-life contacts with spring at the base, far from arcing point . . . strong, zinc-plated steel back . . . 050" bakelite cover for added safety . . . available in 2, 3 and 4-wire models, rated 10, 15 and 20 amps; 125 and 250 volts . . . Underwriters' approved, meet or exceed all Federal and R.E.A. specifications. Add it up and you get another typical P&S device . . . quality, dependability, and easy installation!



P&S
Catalog No. 6051
(3-wire) (Available
from all P&S Distributors)

PASS & SEYMOUR, Inc.

34 Boyd Ave. Syracuse 9, N. Y.

Maker of the famous **P&S-Despard** *Line*

P&S

Interested in $500 trifles?

ONE MINUTE LOST is a mere trifle. But lose one minute out of ten while installing fittings – take 10% too long for the job – and you lose $500 worth of trifles per man per year... Gedney Fittings *stop* such losses, for Gedney's are machined with absolute accuracy and slash your installation time. Order them now.

GEDNEY FITTINGS *FIT!*

- ★ Accurate malleable iron castings... stop breakage
- ★ Threads are machined to closest tolerances.
- ★ Reinforcing ribs for extra strength ... extra grip.
- ★ Smoothed shoulder protects the wire.

GEDNEY
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RKO BLDG. • RADIO CITY • NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

QUESTIONS from readers on problems of industrial equipment, installation maintenance and repair. Answered by electrical maintenance engineers and industrial electrical contractors out of their experience. For every question and every answer published we pay $5.00.

Reader's Quiz

Immersion Heating

QUESTION—Some engineers maintain that immersion heating elements may extend ½ inch above the water surface. Are they correct?—H. S.

ANSWER to H. S.—Immersion heating elements should not be extended out of the water at all if possible. Naturally, fractions of an inch are commercially practical. It stands to reason that where the element is not under water, the heat will not be dissipated as quickly. The dissipation rate in air being at a different rate than that of the water. In general, where the heat is not generated, a degeneration of element does occur and even though small, the same unit being exposed to different expansion possibilities does not dispose of the longest life possibilities of the element.—E. A. M.

ANSWER TO H. S.—Immersion heaters are designed to be entirely immersed at all times when in operation.

The heat generated by the heating element is greater than can be dissipated by contact with air. They depend on the rapid absorption of the liquid to keep them from burning out. If exposed to air the temperature may rise until the heating element melts and the unit is destroyed.

In some types of heaters the heating element may not come within one-half inch of the end of the tube in which case no damage may occur. But why take the chance. I recommend keeping the heating element entirely immersed at all times—it will last longer and give better efficiency.—A. E. T.

Storage Batteries

QUESTION—In the plants in which I work, they have emergency batteries consisting of 60 cells each. These batteries are usually floated on a bus at 129 volts. Each month the batteries are checked for the voltage of the individual cells. Before checking the cells, the charging voltage is raised to 140 volts and left at this pressure for one hour. The cell voltages are read and recorded then the voltage of the charger is reduced to 129 volts. Why is the voltage raised and left so for an hour before checking the cells? —H. G. R.

ANSWER to H. G. R.—The purpose of raising the charging voltage as outlined is to give the battery an equalizing charge and thereby insure that every plate in every cell is brought with certainty to a state of full charge by a reasonable overcharge, until every cell gasses freely, all cells gas at approximately equal rates, and the gravity of all low cells has stopped rising.—R. M. B.

ANSWER to H. G. R.—The voltage is raised on the 60 cells because, at 129 volts, each cell voltage is maintained at 2 9/60 volts. The charging voltage is raised to 140 volts to increase each cell voltage up to 2 1/3 volts, which is just under the maximum volts per cell for lead batteries. After this one hour of 140 volt pressure, the charging rate is reduced to 129 volts, because the amperage rate will be small for a continual charge on the batteries, giving them much longer life and less maintenance.—E. H.

Power Factor

QUESTION—In the use of two wattmeters for the measuring of power in a three phase circuit, what causes the reading of one wattmeter to decrease as the power factor decreases? The power factor of the circuit which I was measuring was less than 50%.—E. J. K.

ANSWER to E. J. K.—Connections of two wattmeters, for a 3 phase balanced or unbalanced voltage or load. The two wattmeters will not indicate alike even if the load is balanced. Above 50% power factor, the 3 phase power is the sum of the two readings. Below 50% power factor, it is necessary to reverse the readings of one wattmeter (by reversing its current leads) and then take the difference between the readings of the two instruments.

The power factor of a circuit is the ratio between effective power and the apparent power.

If, in addition to the two wattmeters, a voltmeter and an ammeter are connected in the circuit, in the conventional manner, the apparent power is found by multiplying the product of the voltmeter and ammeter indication by 1.73.

If the system is only slightly out of balance, the average readings of an ammeter, placed in each lead successively, may be taken as the current, and the average voltage between the leads as the potentials.

Since the active or effective power may be obtained from the wattmeter readings and the apparent power from readings of the voltmeter and ammeter, the power factor of the load may be obtained from the equation:

$$\text{Power factor} = \frac{\text{effective power}}{\text{apparent power}} \text{ or}$$

$$\text{Power factor} = \frac{\text{sum of wattmeter readings}}{\text{1.73 times average line voltage times average line current}}$$

When the current is in phase with the pressure, it is a simple matter because the power or

watts = amperes X volt,

that is, the product of the ammeter and voltmeter readings will give the power. However, the condition of synchronism of current and pressure hardly ever exists in practice, thereby being more or less phase difference.

When the current is not in phase with the pressure, it is considered as made up of two components at right angle to each other.

1. The *active component*, in phase with the pressure.
2. The *wattless component*, at right angles to the pressure.

With phase difference between current and pressure, the product of the ammeter and voltmeter readings do not give the true power, in order to obtain the latter, the active component of the current in phase with pressure must be considered, that is,

True power = volts X active amperes

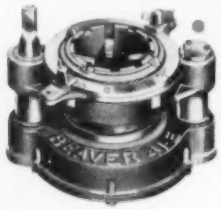
The active component of the current is easily obtained graphically.

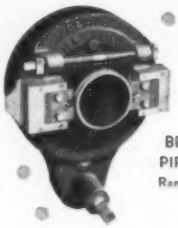
With any convenient scale draw line A B equal to the current as given or read on the ammeter, and line AC, equal to the pressure, making the angle phase between AB and AC equal to the phase difference between the current and pressure.

The Beaver 41-E Threader . . . A COMPANION TO the Beaver 104 Pipe Cutter

both are quality tools—rugged—dependable—and low in upkeep cost

BEAVER 41-E THREADER
Range 2-1/2 to 4"





BEAVER 104 PIPE CUTTER
Range 2-1/2 to 4"

With one set of dies the fully adjustable 41-E Geared Threader threads 2½, 3, 3½ and 4-inch pipe, no dies to become lost or mislaid. Cuts oversize, undersize, standard taper pipe or straight conduit threads—without changing dies.

1. Fully enclosed gears packed in graphite grease, protect important parts.
2. Gear case is made of tough semi-steel. Rugged in construction—low in upkeep cost.
3. Driving pinion's lower end rides in a bronze bushing—greater strength—smoother performance.
4. For 35 years the most dependable 2½ to 4" threader made.

BEAVER PIPE CUTTER, No. 104—2½ to 4"—Automatic knife pipe cutter, for use either as a hand-operated or a power-driven tool. No loose parts. Fully enclosed. Only cutting head revolves, driving pinion remains stationary. Cuts pipe square without burrs. Rugged construction, economical operation.

You ought to know more about these tools. Write for general catalog.

BEAVER PIPE TOOLS

232-300 DANA AVE. • WARREN, OHIO, U. S. A.

From point B, draw line BC perpendicular to AC, then BC will be the wattless component, and AD (measured with the same scale as was used for AB), the active component of the current, or that component in phase with the pressure.

Now the power factor may be defined as: that quantity by which the apparent watts must be multiplied in order to give the true power, that is:

True power = *apparent power* X power factor.

The power factor is numerically equal to the cosine of the angle of phase difference between current and pressure.—O. C.

Rectifiers

QUESTION—Being given a box of assorted dry type rectifiers without data as to type of oxide, permissible A. C. V. etc., how would one go about (a) determining type of oxide, (b) permissible A. C. V., and (c) approximate output in amps.

Any other pertinent data and comments will be very much appreciated. —E.S.C.

ANSWER TO E. S. C.—In view of the many types of dry rectifiers on the market, both standard and special, most of which can use the same metals and different chemicals plus a final coat of paint, yet the ratings are about 24 volts ac per plate on a selenium rectifier, and about 3½ volts ac for other types. I must suggest that it is too easy to damage a good rectifier simply because some people do not want to ask the manufacturer for the rating in volts and amps at the temperature that they intend to operate the rectifier. For forced ventilation, the current rating goes up 2.5 times at air velocities of 800 linear feet per minute. Spacing of cells and stacks can also increase the current rating. 115 volt motors must be connected to 90 volts coming from a bridge 1 phase rectifier unless a filter is used.—H. S.

ANSWER TO E. S. C.—If the plates or discs of the rectifier were examined closely, it would be possible to determine the kind of rectifier. By multiplying the number of discs in series by the volts per disc from the manufacturer's data—the ac voltage could be determined. The ampere output could be determined experimentally by increasing the output gradually until the maximum safe temperature is reached. This latter figure could be checked by multiplying the safe current per disc (from manufacturer's data) by the number of discs in parallel.

If, as is generally the case, the rectifiers have a nameplate and catalog number on the nameplate, this will greatly simplify the work. Nearly all manufacturers have catalogs listing many different rectifier arrangements by catalog number and giving ac volts and output in amperes.—P. S.

Split-Phase Motor

QUESTION—Can one of your readers explain how a split-phase motor driving a fan could be slowed down and increased in speed according to the temperature rise and drop of the air it is circulating?—E.S.H.

ANSWER TO E. S. H.—A split phase motor has a main winding and a starting winding controlled by a centrifugal switch. It is not a variable speed motor.

The centrifugal switch is closed when the motor is started and opens at approximately 70% of full load speed disconnecting the starting winding. The starting winding is not built for continuous operation and if the speed of the motor is slowed down to 70% or less, the starting winding would be connected back into the circuit and be burned out if operated that way for any length of time.

If dropping the speed 10 or 15% would be satisfactory, I would insert a resistance in the line and install a thermostat, single pole single throw, to short circuit the resistance at the temperature high speed is desired.

The danger of this, however, is that in a case of low voltage, the speed might drop enough to allow the centrifugal switch to close and damage the starting winding.

The ideal two speed motor for this duty is a permanent split capacitor motor in which the starting winding remains in the circuit at all speeds. —B.A.S.

Motors

QUESTION—We have on hand a 440 volt three phase 1800 rpm. 30 cycle wound rotor motor with drum controller and resistance bank. This is a 150 horsepower motor. Is it practical to reconnect this for 60 cycle operation?—W.P.R.

ANSWER TO W. P. R.—I doubt if the motor can be reconnected for 60 cycles. I suggest that you consult the local factory agency representing the motor manufacturer or a reputable company capable of rewinding motors. Obtain an estimated price quotation

fluorescent or incandescent

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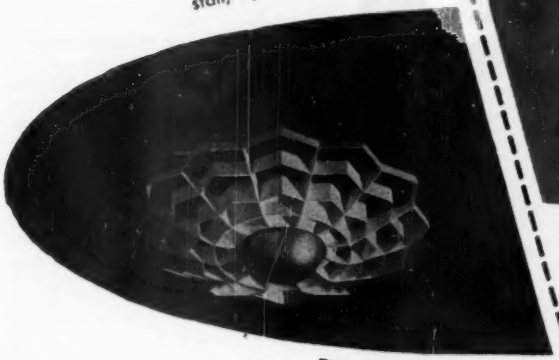
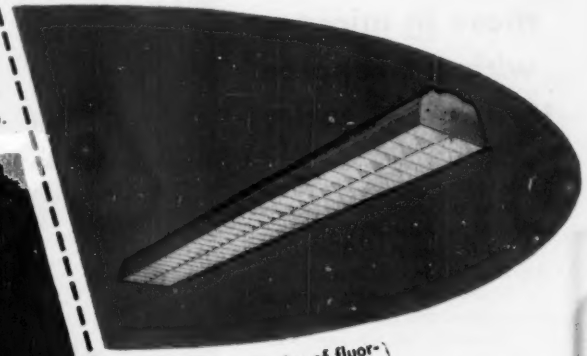
Curtis Sno-Flake for one 300 or 500 watt Mogul base silvered bowl lamp is highly efficient, economical to install, operate and maintain.



THE CURTIS SNO-FLAKE



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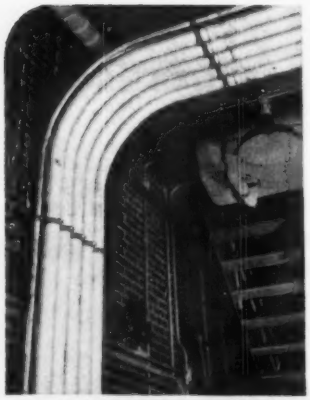

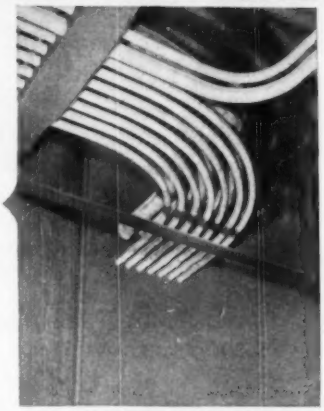

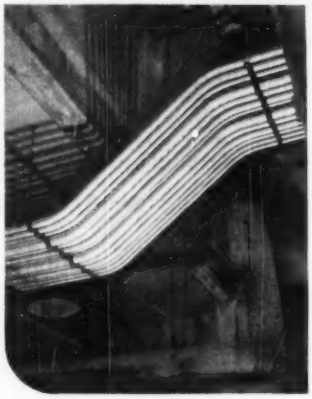

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for rewinding the motor. By comparison of the rewind price, with that of a new motor, it is a simple matter of economics to arrive at the proper decision. I think you will find the rewind job is the solution, providing the motor is not too old and is in good mechanical condition at present.—E.C.E.

ANSWER TO W. P. R.—A complete reply to the question is not possible without complete nameplate information.

Actually, the motor maker could state at once whether the proposed change was possible so if the need for the change is a definite one, it would be the best method of approach.

The speed of 1800 rpm. for the 30 cycle motor indicates a 2-pole stator winding. Assuming the stator winding can be reconnected in two parallel windings, the motor would operate at 3600 rpm. for 60 cycle service or at double the 30 cycle rpm. Whether the mechanical construction of the rotor would permit doubling the rpm. is the question, and this would be the first detail to have checked.

There is no way of telling from the way the question is given, whether the stator structure could be changed in the winding or otherwise to change it to 4-poles, which would give a resulting speed at 60 cycles of 1800 rpm. or the same as the 30-cycle rpm.

To conclude, a change of this nature with a motor of this capacity should be approached with a complete investigation and analysis of the factors referred to. But as previously stated, the motor maker would be in the best position to offer a solution resulting, if it is possible, in a motor operating satisfactorily.—C.O.D.

Busbars

QUESTION—In busbar work I have used the figure of about 1,000 amperes per square inch in calculating the size of busbar to use in my wiring. The question I have is, by approximating what amount do I reduce this figure as I use two busbars (6" width by ¼ thick) in parallel, and by how much if I use three bars in parallel? The spacings between bars being ¼ inch.—E.J.K.

ANSWER TO E.J.K.—There seems no very definite rule to follow. In commercial busbar construction, ventilated busbars are often rated at 1200 amperes per square inch and non-ventilated (enclosed) at 1000 amperes per square inch. Also, I have known of the use of ½ and ¾ inch thick bars with the 1000 ampere per square inch rating. On this basis, it would probably not

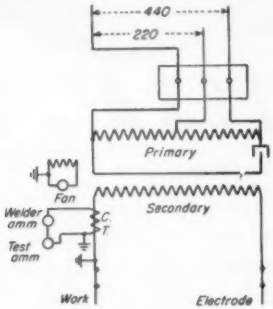
be necessary to reduce the allowable current more than 10 or 15 percent when using two or three bars in parallel.—J.E.W.

ANSWER TO E.J.K.—Copper bus bars are designed on the basis of a current density of about 1000 amperes per square inch of cross-section. There is no good reason why paralleling your busbars should reduce this figure. Since the cooling of bus bars depends upon their surface area, obviously two ¼ inch bars are better than one ½ inch bar.—G.K.

Can you ANSWER these QUESTIONS

QUESTION N17—On our fuel oil storage system, we have a ten inch iron pipe line 20 feet long that gives us trouble during cold weather from thickening of the oil. Would it be possible to heat this pipe electrically in the same manner that frozen water pipes are thawed out? If so, how would one go about designing the necessary transformer?—W. P. R.

QUESTION P17—I found the indicating ammeter on a welding transformer not reading correctly and connected an indicating ammeter in series with welding transformer ammeter and the second ammeter read correctly. I finally revised secondary connections



Primary
126 amps at 220 v
63 " " 440 v

Secondary
Welding voltage 40
Open circuit voltage 75

7 capacitors 34 mu-F
1 GE 0-600 ammeter
10 amp sec

on original ammeter and it read correctly. Why was that necessary? Above is wiring diagram from welding transformer nameplate.—V.E.T.

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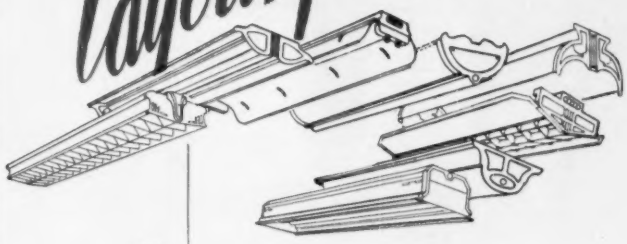

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and

Answered by
GLENN ROWELL
Electrical Engineer
Fire Underwriters Inspection Bureau
Minneapolis, Minn.

and

B. A. McDONALD
Chief Inspector
New York Board of Fire Underwriters
Rochester, N. Y.

Questions on the Code

Lighting for Filling Station

Q. *One of the petroleum companies is remodeling their filling station in this area and is mounting on each filling station island a new type of light standard which consists of a cast iron pedestal. It is then running a circuit in conduit channeled into the concrete driveway to the base of this lighting pedestal where the conduit terminates in a cast metal box which they have filled with compound. Wires are then brought through a bushed hub in this box and are run in the open within this cast iron pedestal base to a lamp fixture at the top of the cast metal pole. I have asked that conduit be run up this pole as I do not feel the present method of installation either complies with the Code or is safe from a practical point of view. The local contractor bases his argument on the fact that this pole is not so designed that a conduit can be extended throughout its length and as the interior of the pedestal is accessible only at its base, he must of necessity wire it as he has been doing in the past. Do you not feel that this is a violation of the National Electrical Code.*—J.A.K.

A. Yes, there is no question but that this is a code violation as Section 5142 states very definitely that all wiring and equipment within five feet of grade on a gasoline dispensing pump island shall conform to provisions of Class 1 Division 2 of Article 500 of the Code; and then under Section 5014 b. for Class 1, Division 2 wiring you will note that either rigid metal conduit or electrical metallic tubing shall be the wiring method employed. Therefore, for strict interpretation of the National Electrical Code the conduit or tubing would have to extend at least five feet above grade within this metal pedestal and then if the interior surface of the pedestal were suitable for raceway purposes, open wiring could be employed from a point five feet or more above the ground. Perhaps you have noted in some filling stations that the circuit to the light standard is contained within conduit running up the exterior surface of the pole to a point six feet or more above grade where the wiring enters the pole through a close nipple tapped into the wall of the pipe standard. Furthermore, you will note that under Section 5015 the Code makes it necessary to provide a sealing fitting in each conduit run where the conduit passes from a non-hazardous to a hazardous location. This section also provides that there shall be no fittings, boxes or couplings between the seal and the point at which the conduit leaves the hazardous area. It therefore would become necessary to mount a sealing fitting in the conduit run somewhere above five feet above the grade at the pump island. Where the conduit is brought up the outside of the lighting standard to a point more than five feet above grade, this can easily be accomplished.—G.R.

Convenience Receptacles

Q. *I have a job and the specifications call for the following duplex convenience receptacles.*

Type II Style NO 102 10A-250 Volts 15A-125 Volts
Type II Style NO 103 "
Type II Style NO 130 "

I am not satisfied with my own findings as to what part of the Code covers the above Type and Style number. A prompt answer would be appreciated.
—L.E.M.

A. It appears that the above type and style numbers are the Manufacturer's designations. The N. E. Code does not identify receptacles by type and style number so the Code cannot help you in this respect. It appears to me that the architect has specified the product of some manufacturer who identifies his receptacles by the type and style numbers shown.
—B.A.McD.

Gasoline Bulk Trucks

Q. *I note the July issue covers the question on Code wiring for gasoline docks. Now we wish to be informed on bulk trucks we intend to purchase for local and interstate service. Full details are desired on Code or Interstate Commerce requirements for the lighting and grounding facilities, if any.*—P.C.Z.

A. Insofar as the N. E. Code is concerned there are no requirements covering the wiring, lighting and grounding of gasoline bulk trucks. Reference to the second paragraph under the N. E. Code introductions will show that the rules of the Code are not intended to apply to automotive equipment. We believe, however, if you will contact the National Fire Protection Association at 60 Batterymarch Street, Boston, Massachusetts, that they will be able to furnish you considerable information concerning the design and construction of commercial trucks and the proper grounding of gasoline trucks to safeguard the static electricity hazard. The question in general is beyond the scope of the N. E. Code.—B.A.McD.

Service Conductor

Q. *We are now in the process of wiring seven small lake cottages owned by one individual who rents them during the summer. It was our plan to use two circuits in each cottage, one fused at 20 amperes for the appliance circuit and one at 15 amperes for the general use circuit. These cottages consist of two rooms, so we believe the two circuits are ample. We had planned to serve each cottage with a three wire No. 12 type RR conductor buried underground, but the local power company inspector claims we must use No. 8 or larger conductors for service wires. Inasmuch as the distance involved and the load is such that voltage drop will not be a determining factor, we see no reason why it is necessary to use a service conductor larger than is necessary for the load supply. If this rule is actually part of the Code, can you explain the reason for running conductors capable of supplying four circuits when only two are needed.*—F.F.O.

A. Under Section 2304 of the Code you will note the size of a service conductor shall be such as to provide adequate mechanical

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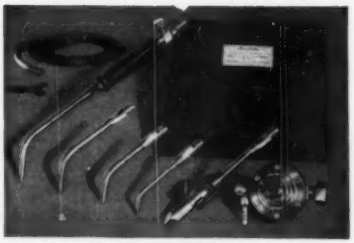

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strength as well as to conduct the current load necessary without a dangerous temperature rise. In this section it further states that conductors used for service entrance shall not be smaller than No. 8 except for installations consisting of a single branch circuit. In your particular case you have a condition for which I do not believe the Code provides any consideration. You do have two alternatives. In the first place you mention the fact that these cabins are all under a common ownership, which indicates they are all supplied through a single meter and in all probability a main switch. It might be possible, therefore, that they are also supplied through a distribution cabinet with overcurrent protection for the individual conductor supplying each cabin so that actually these conductors are feeder conductors and not service conductors. If they are feeder conductors, then the provisions of Section 2304 would not apply and the Code would permit the use of the No. 12 conductor as you have used it. On the other hand, if this is not the case and if each conductor is not properly protected where it receives its source of energy so the wires to each cabin are service conductors, then they must be No. 8 or larger and instead of supplying each cabin with 110-220 volts you could, of course, use two No. 8's to each cabin and supply each with 110 volt service taking the same ungrounded conductor to every other cabin in order that the proper balance can be established. —G.R.

The Laundry Receptacle

Q. *Please tell me why the National Electrical Code specifies plugs in a dwelling containing one 3 prong polarized plug, Article 2124 b, lines 7 to 11, and all manufacturers deliver their appliances with the straight prong plug?*—N.S.

A. The Code, by this provision, endeavors to safeguard the personal injury hazard involved with washing machines or other laundry equipment which are located usually in conductive locations such as the basements of many dwellings. The rule, however, is weak since the installation of a receptacle which accommodates either a two or a three wire cap would satisfy the requirement but does not fully safeguard the shock hazard. The original proposal called for a three pole receptacle designed for grounding without the combination which permits the use of a two wire cap. This proposal, however, was defeated in view of the confusion which might result when

the customer with an old machine with a two wire cord moved into a new house or when the same customer purchased a new machine to be used in an old house with a 2-pole receptacle. At the present time the real value of the rule is the fact that the householder who desires to ground his washing machine may have his electrician do so by merely replacing the cord and cap. This requirement, I believe, also has influenced the manufacturer to combat the hazard by improved insulation.—B.A.McD.

Infant Incubator

Q. *Are there any infant incubators which are approved for use in a hospital delivery room where gaseous anesthetics are used?—R.C.G.*

A. The only type of infant incubator which can be safely used in a delivery room in which combustible anesthetics are employed is one heated by means of hot water bottles. There are several infant incubators approved for use in a nursery or in rooms in which combustible anesthetics are not used. These incubators are designed so they may be used for infants which must be given oxygen. As most infant deliveries are accomplished with the aid of nitrous oxide, which is not a combustible gas, it would, of course, be possible to have one of these approved type of incubators within such a room where only nitrous oxide was employed as the anesthetic.—G.R.

Emergency Lighting

Q. *Does the N. E. Code definitely require an emergency system of lighting to be installed in the auditorium of a school building? I know such systems are required in theaters but I do not classify a school auditorium as a theater. How about it?—G.S.*

A. Section 7001 of the N. E. Code tells us where emergency lighting is required. This Section applies only when such a system is required elsewhere in this Code or by municipal, state or other Codes.

Let's assume in your example that there are no municipal or other Codes requiring emergency lighting. We then refer to Section 5201 and 5202 of the Code to find out where emergency lighting is required.

Reference to 5202 shows definitely that emergency lighting is required in a theater or motion picture house where the auditorium seating capacity exceeds 100 persons.

Reference to Section 5201, however,

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shows that this requirement is not limited to theaters. The requirement covers any building designed, intended or used for dramatic, operatic, motion picture or other shows. In line with this requirement the average school auditorium of today seats more than 100 persons. It is provided with a stage and fixtures such as border and footlights. In many cases a motion picture booth is provided. During the year usually shows are given consisting of motion pictures or dramas enacted by students. The student body, their parents and the public are invited or solicited to attend such performances. Under these conditions all of the conditions and hazards common to a theater exist with the additional hazard that the operators of electrical and stage equipment may not be as experienced as professional stage hands. While such shows are not regular daily affairs as the usual theater, the fact remains that when they do occur the same hazards as a theater are involved and the lives of the people should be safeguarded by the installation of emergency lighting. There is no question in my mind concerning Section 5201 of the Code requiring emergency lighting in a school auditorium.—B.A.McD.

Wiring for Lighting Fixtures

Q. *Section 4179 of the Code has me confused as I cannot conceive of any building owner permitting me or any other contractor to leave an outlet box and cover flush with a ceiling a foot or more away from the recessed lighting fixtures. As I am planning to make an installation of recessed lighting within the next month please advise me just how I can comply with this section of the Code and still make the job presentable to the building owner.—J.D.M.*

A. In the first place it is necessary to determine the maximum temperature at which the recess fixture will operate and this can usually be obtained from the manufacturer. Where this temperature actually exceeds the safe operating temperatures of ordinary building wires, it is, of course, necessary to comply with the provisions of the second sentence of Section 4179 which reads as follows:

"Where conductor temperatures are in excess of 60 degrees C or 140 degrees F conductors shall be brought through at least 4 feet of metal raceway from the fixture to an outlet box at least one foot from the fixture."

Naturally no building owner would permit an outlet box to be cut through the ceiling in a finished room and while Section 3717 of the Code does state that junction boxes shall be so installed that the wiring contained in them may be rendered accessible without removing any part of the building, this does not prohibit locating the box within the concealed space near the fixture so it may be accessible by removing the fixture from the concealed space as the fixture is not part of the building. It is therefore quite common practice on larger types of concealed fixtures to leave one panel or one side wall of the fixture removable so the fixture can actually be left in place and one panel removed in addition to the grille work below to make the outlet box accessible. With such a plan, up to six feet of heat resistant fixture wire can be drawn through a raceway from the fixture to this outlet box where it may be attached to the regular building circuit wiring.—G.R.

Accessible Overcurrent Devices

Q. *Does the Code allow a branch circuit protective device to be installed overhead about 8 feet from the floor? The device is plugged into the busbars.*—N.S.

A. Section 2435-A answers your question. This rule requires overcurrent devices to be readily accessible. The definition of the term "readily accessible," Article 100, excludes a device located 8 feet above the floor as readily accessible. Section 2435-A, however, provides an exception when the busways are used. Section 3650 of the Code covers this exception by recognizing the inaccessibility of overcurrent devices provided they are closed or guarded until they are electrically disconnected from the busway.—B.A.McD.

Underground Services

Q. *Is it required to slope the conduit on an underground service? If it is required, what is the approved means of providing a drain?*—S.D.M.

A. According to the definition of Service Entrance Conductors under Article 100, the service entrance conductors for an underground service comprise the conductors running from the main service equipment to a point outside the building, clear of building walls. As a result any Code rules concerning underground service entrance conductors do not apply to the

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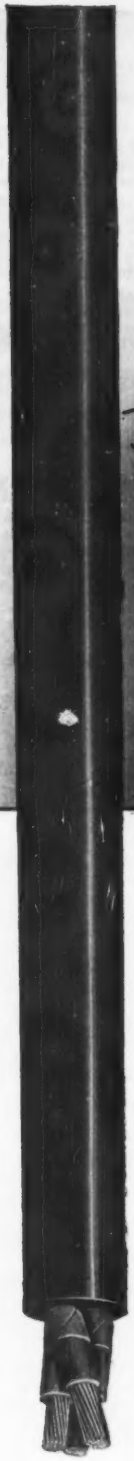

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Easy to use as pliers. Just place the wire in the notched blade, squeeze handles and presto! — insulation falls away, leaving wire clean and bare. *For solid or stranded wire.* Automatic stop prevents snap-back against wire ends. No chance of crushed wire . . . Rugged all-steel construction. Quickly replaceable blades have cutting edge for snipping wires. Six sizes for all wire gauges 8 to 30.

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entire underground run to the vault or manhole. Many Code authorities have given a liberal interpretation on this rule to the end that they agree that very few Code rules apply to underground services ahead of the pull box usually located where the wires enter the building.

Irrespective of the foregoing comments the Code under Section 2314 requires an underground service raceway to be sealed with compound which will prevent the entrance of moisture or gases. This provision indicates that moisture or water may accumulate in such raceways and consideration only is given to keep the water from flowing into the service equipment. In general underground services are covered by 2311, 12, 13, and 14.—B.A.McD.

Official NEC Interpretations

INTERPRETATION NO. 358

Issued July 7, 1950

Section 2124-b
Receptacle Outlets Required in Dwellings

QUESTION: May openings, doorways and the like in room partitions have consideration in determining the application of paragraph b of section 2124 of the National Electrical Code?

FINDING: No, the word "gross" in the text of this paragraph implies no "discount" for door openings and the like.

INTERPRETATION NO. 359

Issued July 3, 1950

Section 3642
Busways, Use

QUESTION: Should the term "exposed work" in section 3642 be understood as not recognizing an installation of busways run in a concealed space between a drop ceiling finish and a floor slab of the building structure?

ANSWER: YES.

INTERPRETATION NO. 360

Issued July 12, 1950

Section 4343-a
Several Motors on One Branch Circuit

QUESTION: Should paragraph "a" of section 4343 be interpreted to mean the sum of two and/or also the sum of several motors, shall not exceed six amperes?

FINDING: Yes. The provisions of paragraph "a" of section 4343 contemplate that no motors supplied be rated at more than one horse power nor have a full load current rating exceeding six amperes. When these limitations are observed, a single motor branch circuit may supply two or more than two motors if the branch circuit over-current protection is 20 amperes at 125 volts or 15 amperes at 600 volts or less and the conductors of the branch circuit have over-current protection satisfying the provisions of Article 240.

INTERPRETATION NO. 361

Issued August 22, 1950

Table 29, Chapter 10.
Electric Range Circuit Overcurrent Protection

STATEMENT: According to Table 29, column A, of the 1947-49 edition of the National Electrical Code, No. 8 conductors are correctly employed to supply a single range.

QUESTION: What is the appropriate current rating for a non adjustable trip circuit-breaker installed as required overcurrent protection.

ANSWER. 40 amperes.

INTERPRETATION NO. 362

Issued September 8, 1950

Section 7003
Emergency Lighting

STATEMENT: The Building Code of a City, where a hospital project is in course of construction, includes a specification under the caption Illumination and Electrical Work; "all operating rooms and operating accessory rooms, where surgical operations or deliveries are performed, shall be provided with an automatic emergency lighting system fed by batteries or by a second source of electrical current and independent of the regular system." Other requirements of the Building Code applicable to the hospital project specify that means of egress to be provided shall have illuminated exit signs visible from the exit approach, indicating the means of egress, for all stairways and passageways of all buildings.

QUESTION: Is it the intent that section 7003, of Article 700, shall be construed as requiring observance of other provisions of Article 700 despite the limitation to the application of the article stated in 7001 and indicated by the phrase, "only when" in view of the limited references to emergency lighting (for operating and delivery rooms) and to exit signs for means of egress referred to in the foregoing statement?

ANSWER. No.

INTERPRETATION NO. 363

Issued August 11, 1950

Section 3882

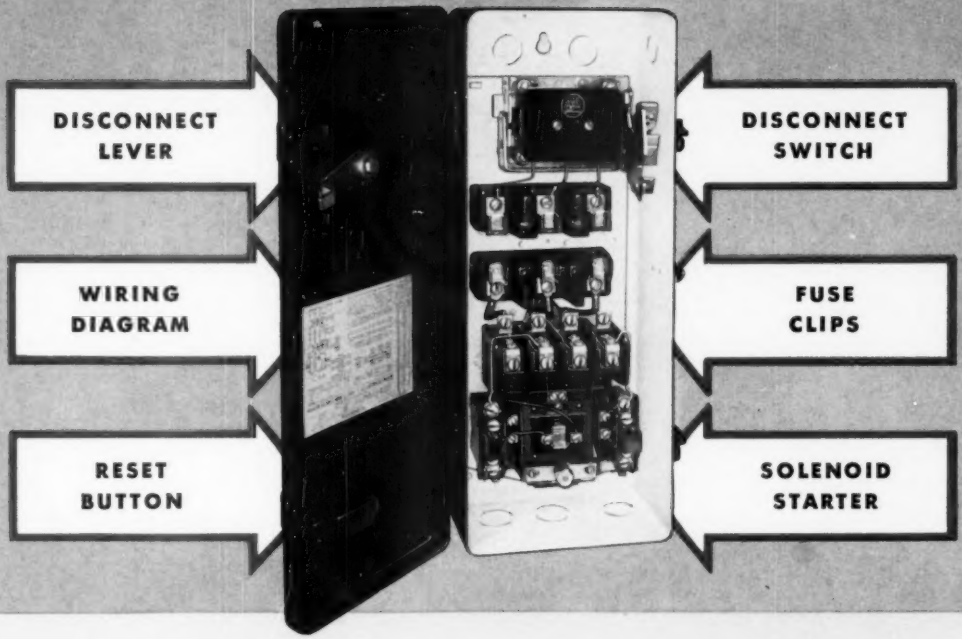
Overcurrent Protection For Panel Boards

QUESTION 1: Does section 3882 require that the overcurrent protective devices on the supply side of a panelboard be installed in the cabinet containing the panelboard?

ANSWER: No.

QUESTION 2: Does section 3882 permit the feeder overcurrent protective device to serve as the overcurrent protective device on the supply side of a panelboard provided it is of a rating that does not exceed that of the panelboard?

ANSWER: Yes.



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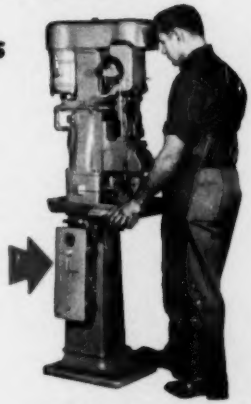
. . . use Bulletin 712 Combination Starters

Starter with lever locked in OFF position with three padlocks for safety to workmen.

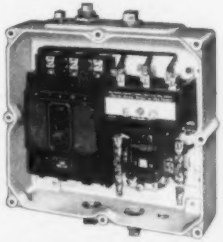
Compactness . . . that is a requirement of modern motor control. Do away with the old style disconnect switches and starters hanging all over your machines and factory interiors. Simplify your wiring jobs . . . make neater installations . . . with A-B combination starters that have all units—disconnect switch, fuses, and motor starter—in a single cabinet. There is greater safety, too. The interlocked disconnect lever must be in OFF position to open cabinet. Starter is then "dead."

Send for Bulletin 712-713 on A-B combination starters —with fused or nonfused disconnect switches, or with circuit breakers.

Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.



Kingsbury drilling and countersinking machine equipped with A-B combination starter.



Bulletin 713 combination starter with circuit breaker in watertight enclosure.

750-M

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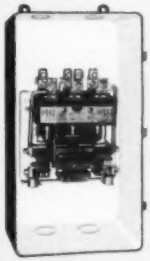
Reason No. 2—MAINTENANCE FREE CONTACTS. Double break, silver alloy contacts need no filing or cleaning. Parallel contacts open and close at same time, assuring longer contact life.

Reason No. 3—COMPLETE RANGE OF SIZES. Only Allen-Bradley offers a complete line of solenoid starters from Size 0 (15 amp) to Size 7 (900 amp). All have double break, silver alloy contacts.

Reason No. 4—ALL TYPES OF ENCLOSURES. The various types of Allen-Bradley enclosures afford proper protection for operators and starters under all industrial and atmospheric conditions.



Allen-Bradley Bulletin 709 solenoid starters—Size 0 through Size 5. Note the white interiors.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

ALLEN-BRADLEY
SOLENOID STARTERS
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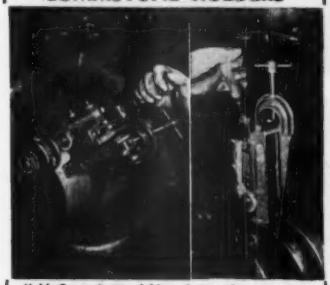
COMMSTONE HOLDERS



Hold Commstones rigid and true for concentric resurfacing of commutators and slip rings while running at normal speeds in their own bearings. Interchangeable boxes 1", 2" and 3" wide handle grinding jobs up to 4¼" wide.

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WIRE STRIPPER

Made to fit the hand, this tool which is made of the best grade spring steel has easily sharpened cutting edges.

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The coarse teeth on this tool bite firmly into wood and fibre wedges and save time in removing them quickly.

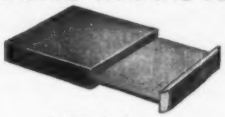
WEDGE DRIVER

Has outer shell made of brass to avoid rust. Driving pin made from steel.

HANDLE TYPE COIL TAMPER

Same tamping as standard tool shown below but has 12" handle with spoon shaped end to press coils in place.

STANDARD TAMPING TOOL



Available in three sizes

Write for 64-page catalog of Martindale Maintenance and Production Equipment.

MARTINDALE ELECTRIC CO.
1309 Hird Ave. Cleveland 7, Ohio

LIGHTING ACCENTS SUBURBAN STORE

[FROM PAGE 63]

shielded by a cornice. The walls are plaster finished pastel green with 60 percent reflectance, while the wall and floor cases are wood with a very light blond finish. Floors are covered with green linoleum having a reflectance of approximately 40 percent. A square pattern design in the linoleum conforms with the lighting arrangement and results in a harmonious design treatment.

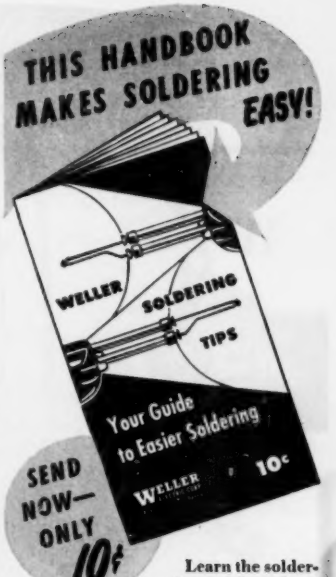
Concentrated 150 watt PAR 38 spotlamps in Swivelier units spaced on three-foot centers highlight the jewelry counters. Also, there are several shadow box displays set at prominent locations above the wall cases.

The basement floor is lighted to an average intensity of approximately 75 footcandles by three-lamp 40-watt Pittsburgh recessed louvered troffers, selected because of the low nine-foot ceiling height. These troffers are run continuously across the width of the store, spaced eight feet on centers. Breaks in the continuous rows were necessary in part of the area due to header beams running at right angles to joints.

Lighting control is through switch panels located at the rear of each floor. The first floor square ceiling units are wired with two 15-ampere circuits to each unit, and switched for one-half and full intensity. Show window lighting is controlled from a switch panel located in the basement which, in turn, is controlled through a Paragon program clock.

Harry A. Goldberg & Co. were the electrical contractors, and H. M. White, illuminating engineer with Consolidated Gas Electric Light & Power Co. of Baltimore, cooperated in the design of the lighting system.

CONTRACTOR E. E. Evans of Columbus, Ohio, talks about wiring techniques with A. Holmes (right), American Metal Moulding Co., Chicago. Both were at Western Section, IAEI meeting in Detroit.



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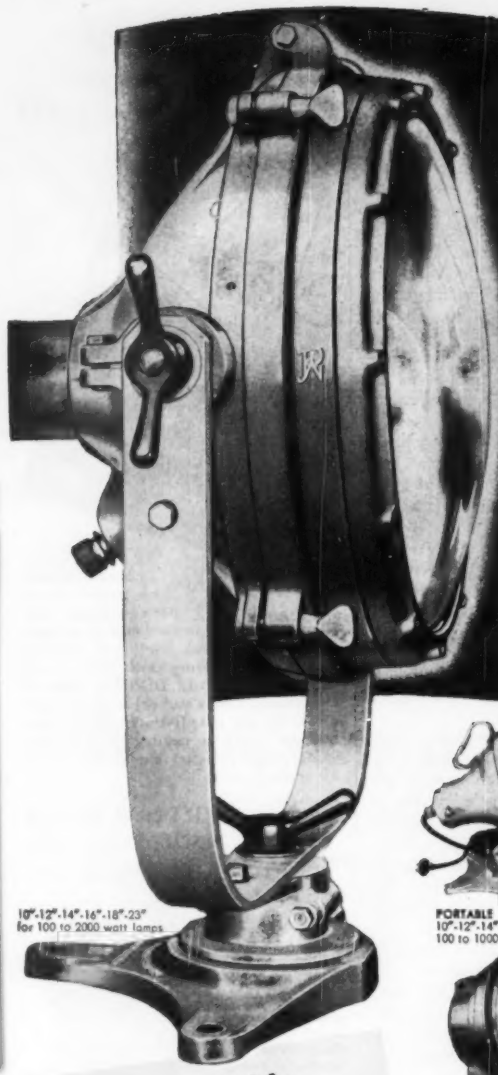

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Industrial Electrification

Electrical Recording Instruments—Part III

The use of graphic instruments to help solve operating problems of production machines and processes.

By Chester M. Poor
Application Engineer
The Esterline-Angus Company, Inc.
Indianapolis, Indiana

PERFORMANCE analyses of machines in actual operation are and will continue to be the foundation upon which to plan new designs. Before the advent of graphic instruments, machine performance was judged largely by observation and the results were necessarily qualitative in nature. Now, quantative records can be obtained. Detailed analyses of such graphic records may form the basis of determining adaptability of machinery to specific uses; design of new machines; or improvement of existing designs.

Whenever we have machinery, we have a safety problem. Safety of men and machines depends upon the provisions made to safeguard them against the shortcomings of human beings and failure of materials. Experience has shown that many sources of danger can be anticipated by instruments which detect adverse conditions and provide a danger signal in the form of a record chart.

Operation of Machines

A large plant manufacturing steel tanks drawn from sheet metal always tests energy consumption of each set of dies with a graphic wattmeter, before the tools are placed in regular production. The section of record chart shown in Fig. 10 shows a minimum of 5 kilowatts and a maximum of 30 kilowatts.

Quite frequently new tools do not work as freely as they did in this instance, and any binding or excessive pressure is immediately disclosed by the power curve. By this method of carefully recording the energy consumption of new tool equipment before releasing it to the production department, the presses and the tools are safeguarded against undue strains.

In the case of hydraulically operated presses, similar information can be obtained by means of a graphic pressure recorder connected to the operating cylinder. Since the cylinder pressure is a measure of the mechanical resistance to be overcome, the chart from such an instrument shows the work being done on the metal throughout the cycle. This method is used both to test and fit new dies, and to detect wear or misalignment of tools.

We are just beginning to apply the scientific method of determining what is going on in manufacturing processes. Because the graphic, or scientific method, is yielding such rich returns, it is becoming more and more popular.

Design and Selection of Machines

In the selection and design of machines, production executives are being guided by graphic records. Quite frequently, plants will try to add equipment to a department by using the "rule of thumb" method and then find that intensive graphic studies must be made to straighten out the difficulties caused by overloads.

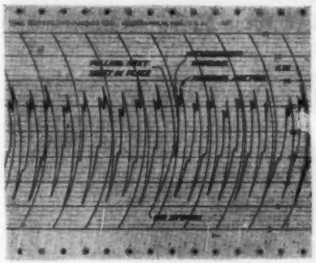

FIG. 10—Wattmeter chart of 30 hp motor on press forming steel tanks shows work done during complete cycle; provides means of testing new dies and tools.

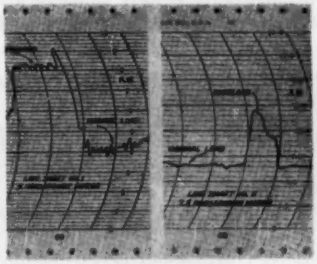

FIG. 11—Excessive overloads on two line-shaft motors were detected by these graphic charts; went unnoticed on indicating instruments.

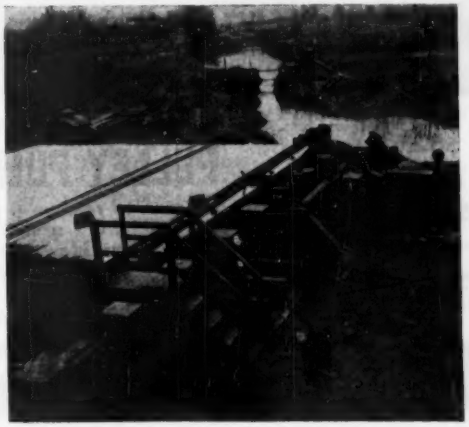

FIG. 12 — Electrical control design on this steel mill hot bed was based on engineering data secured from graphic instrument charts made on experimental runs.

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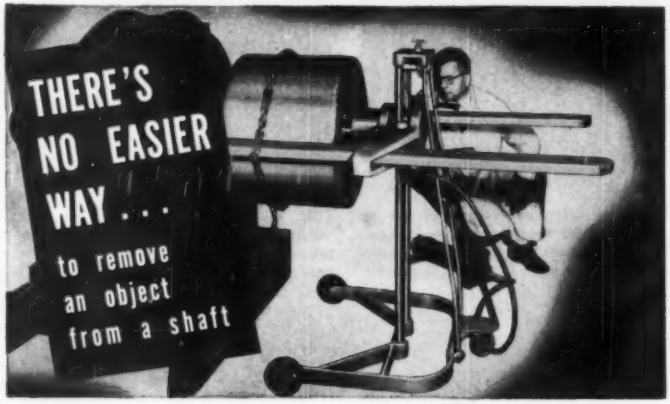

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INDUSTRIAL ENGINEERING EQUIPMENT COMPANY
122 - 124 E. 4th St. Davenport, Iowa

A typical example of arranging motors by the guess method and again by the graphic instrument method: The officers of an eastern radio manufacturing plant decided to revamp their screw machine department and install some additional machines. The electrician said that the only equipment he had for determining motor loads and capacities were "an indicating ammeter and voltmeter, and my 'rule of thumb knowledge'."

When the changes were made, and department operation began, some motors had difficulty starting while others overheated in a short time. The electrician finally rented a graphic wattmeter and made a survey to locate the trouble. The graphic record showed that several high speed machines caused excessive peak loads on certain motors; that due to these peaks and to the loads of the stiff line shafts, some motors were overloaded from 75% to 100%. Fig. 11 shows two of these cases.

The whole job of arranging motors and adjusting loads had to be done over. Wasted time and labor occurred simply because, in determining the motor capacities originally, the short tests made with an indicating instrument did not disclose all the characteristics of the load. Graphic wattmeter charts would have given a complete picture of the requirements and made it easy to do the job right the first time.

We should also bear in mind that graphic instruments are equally useful in the design of new equipment. A good example is the use of graphic instruments by engineering of a steel mill, in the design and construction of an automatic hot bed to which red hot steel billets could be sent to cool, then be automatically returned to the mill (Fig. 12). When a hot billet reaches the cooling table, over a system of motor-driven rollers, it closes a flag switch. This starts an electric motor which operates a number of rams that push the cooling billet sidewise and drops it on the return conveyor to make room for the next hot billet .

It was necessary to work out carefully the controls for this motor so it could move a dead weight of 60,000 pounds of steel 200 times an hour, without straining the equipment or the foundations. Dynamic braking was also required to bring the pusher and motors quickly to rest. Time for a complete cycle was only 18 seconds.

With no operating data at hand, the engineers designed and built the equipment; used graphic instruments to obtain data on which final design of the control system was based. The *graphic tachometer* recorded the motor speed; a *graphic wattmeter* recorded input to the pusher motor.

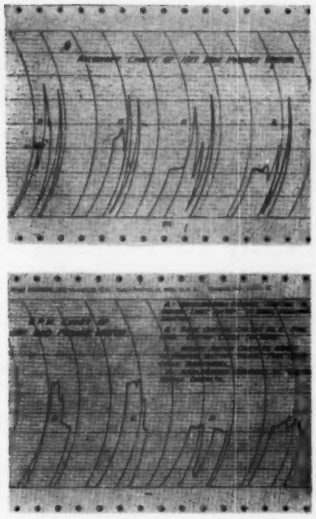

FIG. 13—Simultaneous charts made of motor kilowatts and speed on steel mill hot bed illustrates type of data engineers used in designing electrical control.

In Fig. 13 are shown two of the many simultaneous wattmeter and tachometer charts made during the development adjustment of the control apparatus. After each change, new tests were run and the process continued until desired operating characteristics were obtained. These charts show clearly how useful graphic instruments can be in engineering a new product.

Promotion of Safety

The application of graphic instruments in the promotion of safety are many and varied. One important use is to enable one man to review the actions of another. Whether we recognize it or not, most shortcomings of individuals are psychological. Checking a man's disposition to err, forget, or drift, is an important phase of safety procedure.

Experience has shown that the best defense against charges of carelessness or negligence is an accurate and permanent record of the conditions that actually existed at the time of an accident.

When a steam turbine is shut down and allowed to cool, its parts contract. If a cold turbine is put into immediate operation at normal speed, those parts in actual contact with the steam will expand quickly while other parts are yet relatively cool. This will cause unbalance, set up heavy internal stresses in the metal, and may bring moving and stationary parts in contact.

To determine whether a unit is brought up to temperature gradually,

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Here's the practical, efficient way to bend 1¼, 1½ and 2" electro-metallic tubing. Of special interest to electricians is the fact that this job can now be done with Blackhawk's remarkable all-directional "Porto-Power" hydraulic unit.

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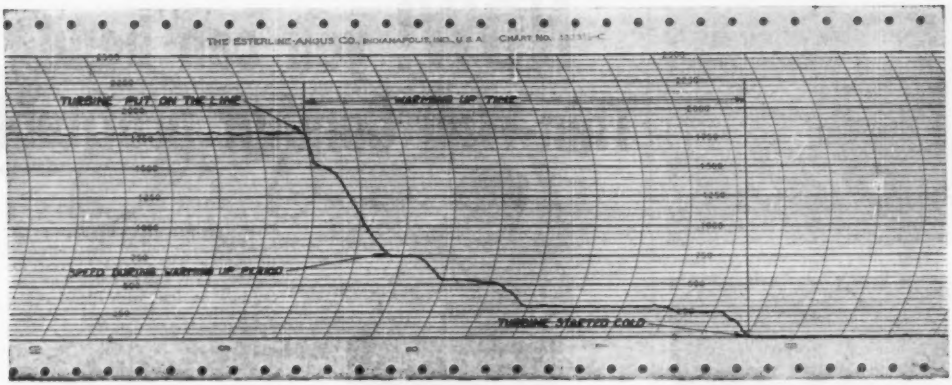


FIG. 14—Warming-up period of a steam turbine shown on a graphic chart. Speed recorders also check governor performance and safety devices.

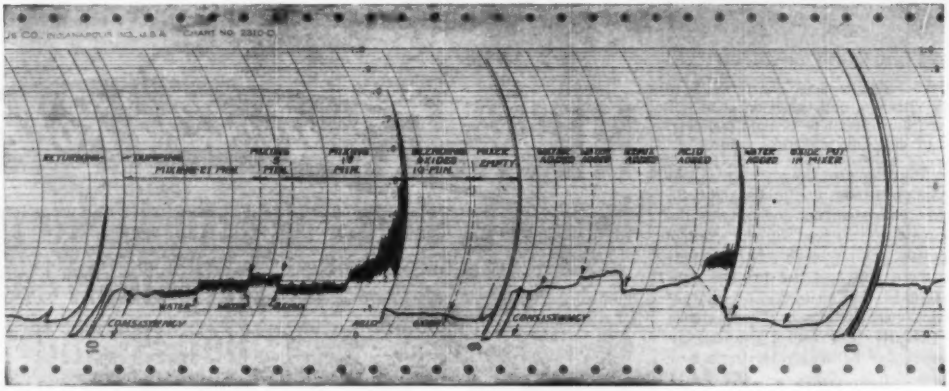


FIG. 15—Process control with graphic wattmeter chart of motor driving paste mixer in electric storage battery plant. Chart covers two complete cycles; gives accurate timing of steps; shows consistency of mix; uncovers conditions that might lead to loss of the batch.

giving the heavy parts time to warm up, most large turbines are equipped with speed recorders. In Fig. 14, the record of a warm-up period for a large turbine is shown. There are two advantages of having turbines so equipped. If, because of wear or liming up, or for any other reason, the operation of the governing apparatus is faulty, that condition is usually reflected in the speed recorder. Likewise, the functioning of the governors can be studied during periods of extreme loads or when disturbances occur.

In addition, turbines are equipped with over-speed devices. To insure that this device is in working condition, it is advisable to test its operation at frequent intervals. The chart from a speed recorder shows whether or not this check has been made and at what speed the device functioned.

In studying processes, whether for the development of a new one, or the refinement of an existing one, the use of graphic instruments provides one of the most interesting and fruitful of instrument applications. Every manufacturing plant can be used as a laboratory for continuous study and search for improvement.

Some results obtained by charting and analyzing existing equipment and processes are so important that companies are reluctant to divulge them. However, an example or two of the work done will show how graphics may be used.

In a Wire Mill

In an eastern wire mill, complaints were made that a 60 hp motor was repeatedly overheated. A chart from a graphic instrument inserted in the motor circuit showed that the motor was being repeatedly stopped and started —the cause of overheating. Further investigation revealed that the mill was being frequently stopped to insert new coils of wire. The engineer's suggestion that a spot welder join the coils of wire for continuous feeding resulted in: elimination of motor overheating, reduction of controller maintenance, and saving of much lost time.

In a Paste Mixer

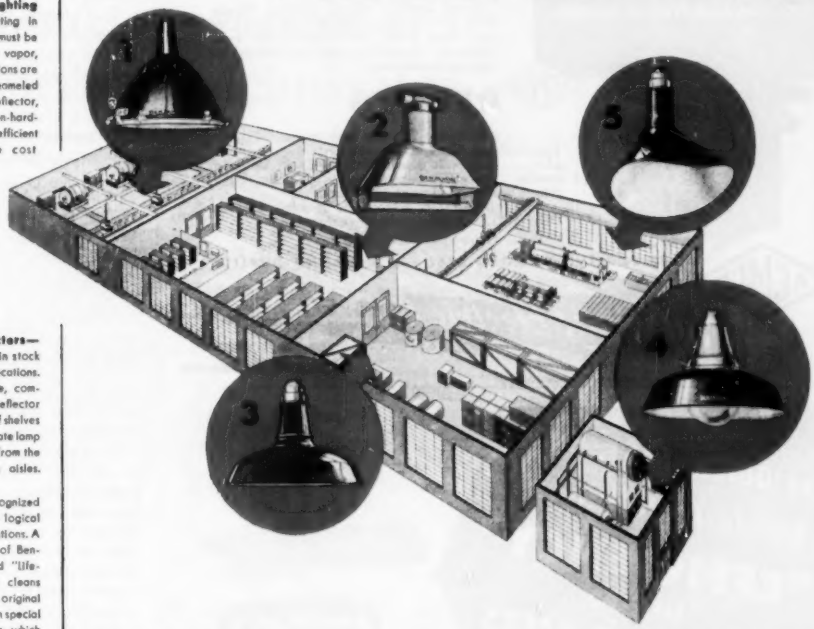
The use of graphic instruments as a guide to a manufacturing process is illustrated by the problems of a manufacturer of storage battery plates. Because chemical reactions are complicated and not completely understood, and since the exact crystalline form and particle size of the materials are as important as their chemical analysis, no simple chemical test will serve as an adequate guide for the paste mixing process. Since the slightest change in the character of the mixed paste has a profound effect on performance of the finished batter, such a process guide is necessary. Graphic instruments provided the answer.

The chart in Fig. 15 is a record from a graphic wattmeter placed in the circuit of a motor driving a paste mixer.

HOW TO IMPROVE PLANT LIGHTING
through the Specification of Benjamin
INCANDESCENT LIGHTING UNITS

GOOD PLANNED LIGHTING recognizes the importance of specifying INCANDESCENT LIGHTING UNITS where their application will economically solve lighting problems due to location, atmospheric condition, seeing task or cost limitation.

1 "STEELITE" Armor-Clad Lighting Units—Designed for good lighting in Foundries, Mills, etc., where units must be mounted high and where smoke, vapor, dust or other severe service conditions are present. Heavy-gauge porcelain-enameled steel housing, Alzak aluminum reflector, heat-resisting glass cover and non-hardening gasket cover-seal assure efficient operation at low maintenance cost



2 "STOCK-BIN-LITE" Reflectors—Efficiently lights shelves and bins in stock rooms, tool cribs and similar locations. The deep-skirted reflector shape, combined with exclusive V-shaped deflector bar provides uniform illumination of shelves and bin tiers, while assuring adequate lamp shielding to prevent direct glare from the lamps when looking down the aisles.

3 RLM DOME Reflectors—Recognized throughout industry as the most logical choice for thousands of plant locations. A top favorite for years because of Benjamin's battle-ship durability and "Life-Time" Porcelain Enamel which cleans easily and permanently retains its original high lighting efficiency. Available in special Benjamin "Turnlox" hood design which permits reflector and lamp removal as one unit for cleaning on floor or bench.

4 "HEAVY-DUTY" VAPOR-TIGHT Lighting Units—Rugged, weather-proof vapor-tight units have heavy-gauge porcelain-enameled steel reflectors with non-corroding copper neck and aluminum cast hoods. "Made to order" for boiler rooms, pump houses and similar locations, where steam, moisture and non-hazardous vapors demand lighting equipment which can withstand the deteriorating effects of such atmospheres without break-down or need for frequent servicing and replacement.

5 "ELLIPTICAL ANGLE" Reflectors—For lighting from the side; specially built to overcome lighting difficulties caused by overhead obstructions like travelling cranes or tall machinery. Elliptical reflector shape not only directs light forward, but also to the sides. This helps build up illumination laterally, so light is adequately overlapped between units to prevent harsh shadows and annoying contrasts.

From the standpoint of economy, performance and adaptation to special environmental and operational conditions, Benjamin incandescent industrial lighting units are the best possible solution to many plant lighting problems. Good planned lighting, therefore, utilizes Benjamin incandescent units whenever their advantage is indicated.

Spotted around the model factory layout above, are typical examples of the application of Benjamin incandescent industrial units to plant lighting problems. In addition to solving these problems, the specification of Benjamin equipment brings the extra benefits of Benjamin "built-like-a-battleship" construction and Benjamin design advancements which facilitate maintenance and reduce operating costs.

How Benjamin incandescent lighting units may be used to solve plant lighting problems, is explained in the new Benjamin manual, "A Planning Guide to Improved Plant Lighting." This 36-page guide demonstrates the application of the 12 major Benjamin Lighting Systems to factory lighting problems, and contains much data relating to the use of incandescent lighting units for special "problem locations," such as are indicated above.

Your FREE COPY of the GUIDE will gladly be sent without cost or obligation. Simply address your request to: Benjamin Electric Mfg. Co., Dept. H, Des Plaines, Illinois.

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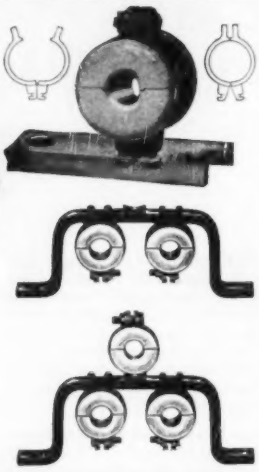

Efficiency Nested Conductor Racks are simple, compact and are scientifically designed to carry conductors equidistant from center to center. One bolt supports the bushing and clamps the bushing support to the frame. Available in 2-3-4-5 and 6 bushing racks.

Write for Catalog 38-A

After installation of the meter, rejections in the battery plant were considerably reduced. Graphic wattmeters permanently installed on paste mixers in battery plants accomplished the following distinct results:

1. Providing an easy and simple check on whether workmen were following prescribed schedules accurately. It is easy to detect if ingredients were added at the proper time and in correct quantities.

2. Graphic records enabled operators to recognize changes in behavior of materials due to causes beyond their control, and to make suitable corrections for these changes.

3. Through study of such records, engineers of one specific plant were able to analyze its paste-making process critically, simplify process, reduce total time and power consumption.

4. Use of graphic meters has reduced maintenance costs by almost completely eliminating breakage of mixers.

Problems of Products

The industrial impetus of World War II plus the gigantic strides made in electronics, did much to advance the application of graphic instruments in the field of inspection and testing of manufactured products. More and more, automatic inspection is being used to detect errors of men and machines. Again, a few case examples will illustrate the possibilities.

Recording Weights

Weights ranging from a few pounds to several thousand pounds can be graphically recorded by connecting the pen staff of the graphic meter to the linkage of a standard direct reading scale so that the movement of the pen on the chart is directly proportional to the weight on the scale. This method is being used for a variety of purposes. Among them: Recording weights of animals in slaughter houses; weights of cement, sand and water in concrete mixing plants; and weights of materials in sacks or boxes passing along a conveyor.

Product Final Inspection

Equally important as the checkup on material and machines, is the final or performance check on a finished product. Frequently, the product must be carried through a complete cycle of operation to assure its functioning within specified limits. This is quite different from merely checking a piece with micrometers or "go" and "no-go" gauges. A cycle test may take from a few minutes to several hours to complete and the required data might be beyond the scope of human energy to record.

One specific application is the final inspection of quartz crystals used to

neoprene notebook

FACTS ABOUT NEOPRENE FOR THE ENGINEER

SERIES 45

Published at Wilmington, Delaware, by the Rubber Chemicals Division of E. I. du Pont de Nemours & Co. (Inc.)

DYNAMIC PROPERTIES OF Neoprene Vulcanizates

Recent studies of the dynamic characteristics of neoprene vulcanizates have extended practical applications for neoprene products in many fields

SINCE 1930 not only has the use of elastomers in dynamic applications increased, but much progress has been made in the development of test methods for determining their dynamic properties.

Because neoprene was specifically developed to overcome many of the limitations of natural rubber, it has been found useful in dynamic applications where service conditions are too severe for satisfactory performance of natural rubber parts.

The use of elastomeric compositions in dynamic applications usually requires a knowledge of the following four properties: deflection under load; resilience; creep under static dynamic conditions; and heat build-up. Of these, only resilience and heat build-up can actually be considered dynamic properties. Thus, deflection under load and creep will be mentioned only briefly.

Although measured static load-deflection characteristics of a composition are extremely important in the design of vibration mountings since they determine the natural frequency of any mounting composition is used. The natural frequency of elastomeric springs decreases as the deflection increases. This, in turn, affects isolation efficiency—high efficiency being characteristic of mountings having a low natural frequency.

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Adapted from "The Dynamic Characteristics of Neoprene Vulcanizates" by N. L. Catton, H. W. N. Keen of the Du Pont Rubber Chemicals Division, presented before the Division of Rubber Chemistry of the American Chemical Society in Los Angeles, Calif.

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control the frequency in communication receivers and transmitters. These crystals are smaller in area than a postage stamp and are approximately 1/32-inch thick. The tolerance is so slight that a millionth of an inch can change the frequency characteristics of the crystal. Therefore, crystals which are to operate on the same frequency must be exactly the same and must operate accurately under the different temperatures encountered in all parts of the world. There is at least one crystal in every communication set and in some of the more complicated sets there are as many as 200. Each must match the other.

During World War II, final tests were made on these crystals by using a temperature chamber. The various data were recorded by temperature recorders and recording milliammeters. The latter instruments were used to show the deviations in frequency and activity at the various temperatures.

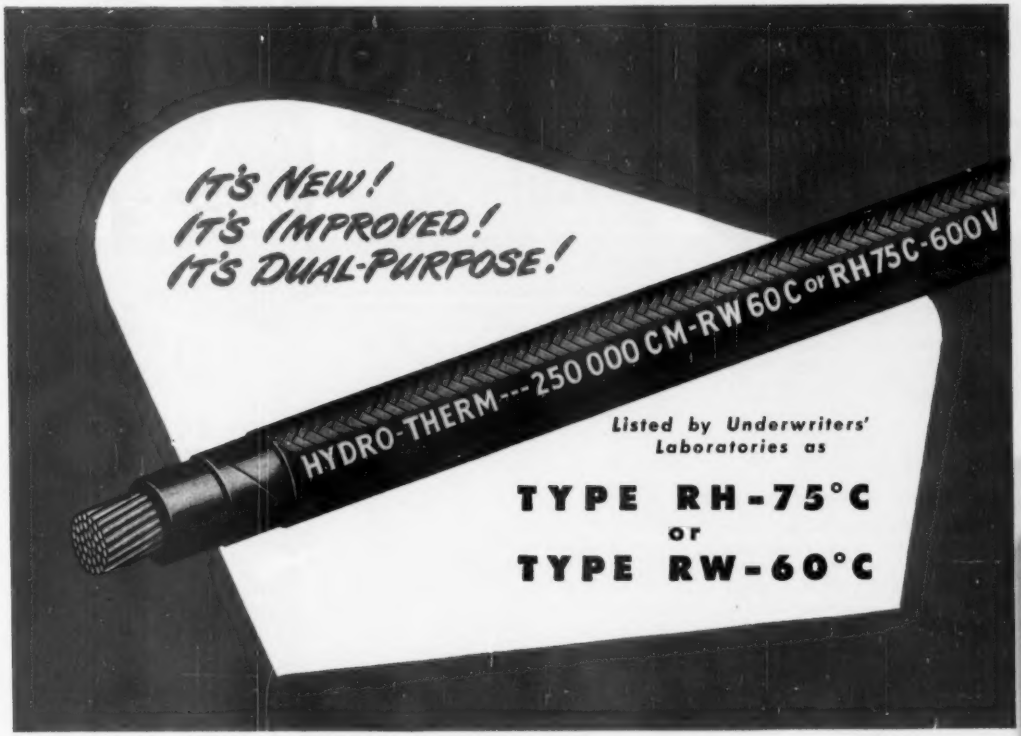
One manufacturer used 20 such chambers in each of which 50 crystals could be simultaneously carried through a range of temperatures from 120°C to —50°C. Frequency recorders were connected to a crystal for a three second period, then automatically shifted to the next. In the total test time of one hour each crystal was recorded on at least 20 points for each of two measurements, or at least 20 points for each of two measurements, or a total of 40 separate tests. A total of 2,000 recordings were made per hour—a physical impossibility if entrusted to human observers. This one manufacturer could turn out between 20,000 and 25,000 crystals every 24 hours with the aid of the recording instruments. It would have been hopeless to attempt to gather by usual means, the amount of data provided by the automatic method. The number of people required and the time consumed would have been out of the question.

Such tests are not limited to crystal testing. Many and varied industries have applied the same basic fundamentals to their problems. Among these are: life tests on motors; tests on washing machine transmissions, radio sets, thermostats for electric stoves, and electric lamps. Recorders are irreplaceable for any test which must be carried through a time cycle.

Problems of Men

Continual efforts are being made to supervise workmen by means of reports written by the operator. But manual records are only as good as the man who makes them.

Since the advent of the graphic meters, management has a means of continuously measuring and recording the *actual* rate at which useful work is



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Paranite Hydro-Therm combines in a single wire the heat-resistant qualities of Type RH and the moisture-resistant qualities of Type RW.

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USED IN WET LOCATIONS Paranite Hydro-Therm is rated as Type RW wire for 60°C operation because of its excellent moisture-resistant qualities.

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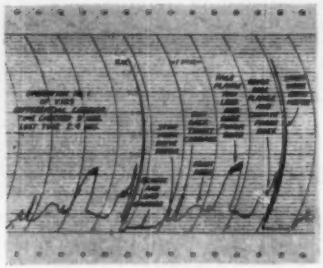

FIG. 16—Six operations on a turret lathe were recorded on this graphic wattmeter chart. Improved tooling made on basis of chart data saved 30% time on this operation.

being done in any part of a plant at any time during the various working shifts.

Checking Work Habits

An example of substantial savings is found in the report of an eastern light and power company. To get the demand load of a certain mill in the territory, the utility installed a graphic wattmeter in the supply circuit of the plant, which was running with a day and night shift. The meter chart recorded the demand but uncovered a condition of far greater importance.

The night shift was taking a very long midnight lunch hour. About 11.00 o'clock the load would start dropping off and the plant would not be back to full load until about 2:00A.M. *The savings effected by this discovery exceeded the consumer's demand charge.*

Thorough and continuous studies of all the factors affecting the cost of a finished product must be made to bring costs within the limits fixed by competition. Graphic recorders have been widely used to make such time studies and have several specific advantages. They do not require the presence of an observer; can be carried out economically over long periods of time; and results will not be effected by an observer's presence.

Multiple Operation Studies

With a single graphic instrument, it is frequently possible to study a variety of operations occurring either in sequence or simultaneously. This is important in time study work. Fig. 16 shows part of a time study of six operations on a turret lathe machining an automobile differential carrier. Several of the operations are carried on simultaneously during the four-minute complete cycle.

The interval for unloading and loading is about one minute, or 25% of the total time. A check of the 9-hour chart showed that, by making a few changes in tooling, two hours and 24 minutes could be saved during the period—a saving of almost 30% in labor cost.

"AUTO-GRIP"... the revolutionary NEW Front Chuck that grips the pipe automatically... is now standard equipment on the Oster No. 422 POWER VISE STAND and all other Oster 2" pipe machines which revolve the work.

Watch this speedy "AUTO-GRIP" in action. Operator spins the handwheel until the chuck jaws strike the pipe. Then he starts the machine. Jaws grip the pipe automatically. THE TOUGHER THE PULL—THE TIGHTER THE GRIP ... on any kind of pipe... steel, iron, galvanized, etc. No chuck bar—no T wrench needed.

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If you're not an Oster owner, NOW is the time to check up on what the Oster line of 1950 offers you: EXCLUSIVE, ADVANCED FEATURES AT COMPETITIVE PRICES OR *LESS!*

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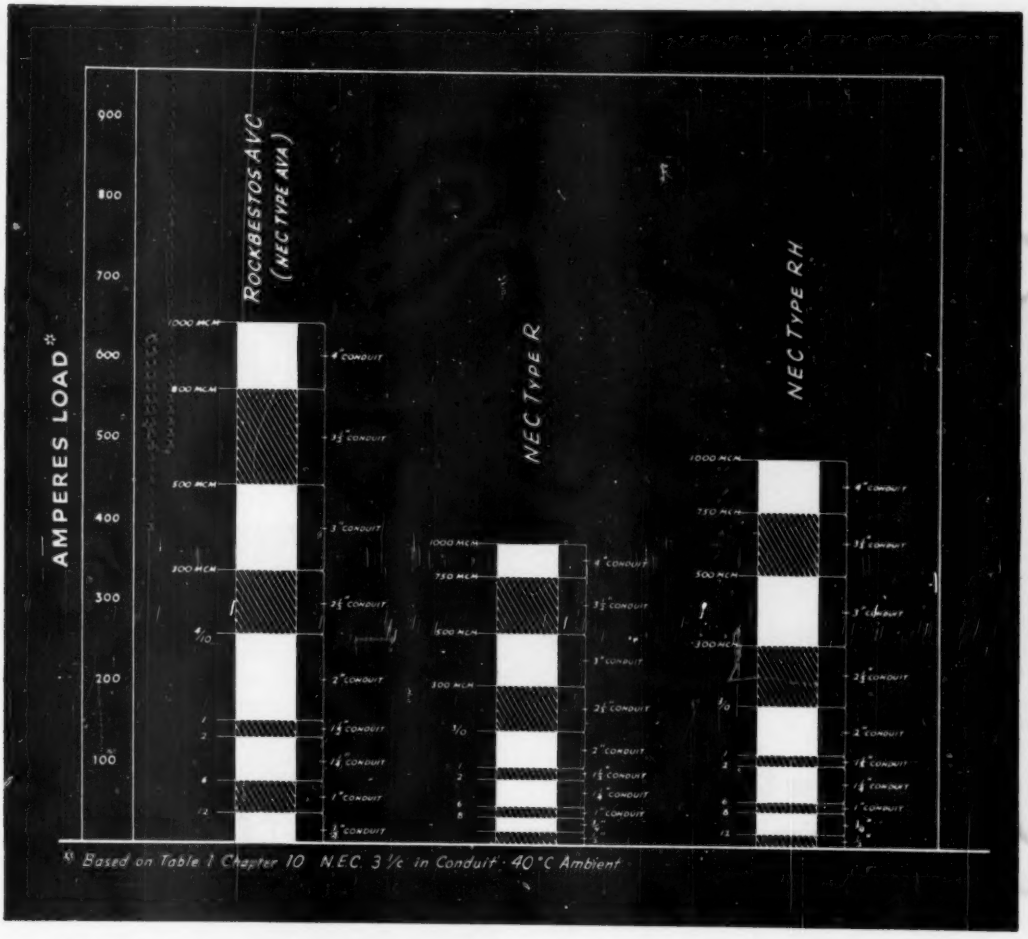

Here's the fast, inexpensive way to take care of electrical loads that have outgrown their conduits — just replace present cable with Rockbestos A.V.C. . . . *with Rockbestos A.V.C. you can increase conduit capacity without increasing conduit size.*

Use A.V.C. whenever load growth outruns present wiring. With it you can easily increase capacity without buying and installing larger conduit or fittings. Write today for the booklet "Rx for a Building with Hardening of the Electrical Arteries."

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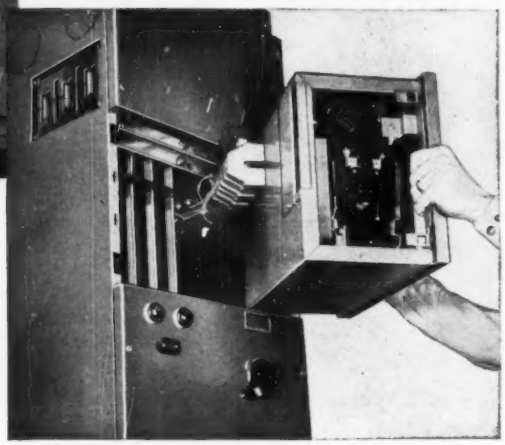


New Features Save Floor Space, Speed Up Wiring, Facilitate Operation

LESS FLOOR SPACE NEEDED

Compact trough design allows more troughs to be used in a given area of floor space.

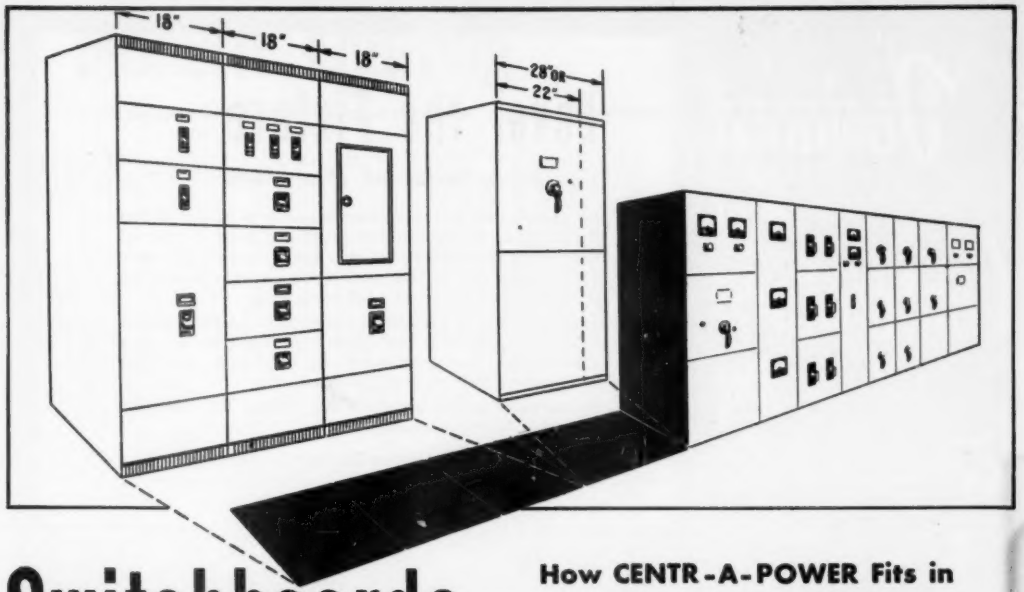
LOTS OF ROOM FOR WIRING

Generous (4 x 8 in.) wiring gutter makes wiring easier —can be accomplished with units in the trough—and allows use of over-size cable on long runs, keeping voltage drop low.

ACCESSIBLE FROM FRONT

CENTR-A-POWER Switchboards are completely accessible from the front, permitting aisle, back-to-back, "L" and "U" installations, further saving floor space.

TRUMBULL'S TRAINLOAD OF NEW PRODUCTS



Switchboards

. . . at money-saving prices

To save you money on installation time and maintenance costs, Trumbull has designed a new type of switchboard for complete low voltage (600 V and under) switching requirements. Because of pre-engineering and standardization, you can now have the highest quality construction at the lowest possible cost. Here are some of the features:

Pre-fabricated, rigid steel troughs can be placed in any arrangement to provide a completely dead-front, totally-enclosed switchboard. Wiring gutter design is such that load wiring is isolated from incoming load bus. Compact switch or breaker units, called CENTR-A-PLUGS, are easily mounted or removed. A quick-clip attachment saves time in installation, inspection and maintenance. Self-aligning latches replace bolts and nuts. Positive connection to bus bars is assured by use of spring-loaded, reinforced stabs. Each CENTR-A-POWER unit self-contained and electrically isolated from adjacent units.

How CENTR-A-POWER Fits in with Your Present Rigid Type Switchboard Equipment

CENTR-A-POWER is made from three standard troughs, all 90 in. high. At left is unit type CENTR-A-POWER with 18 in. trough; it handles fusible switches through 200 amp. and circuit breakers through 600 amp. Two standard section troughs are indicated in the center. Type A is 22 in. wide, handles 400 and 600 amp. fusible switches. Type B is 28 in. wide, handles fusible switches through 1200 amp. and circuit breakers through 1600 amp.

Unit-Type Troughs (18 in.) are furnished assembled or unassembled. Large standard sections are furnished assembled only.

ASK ABOUT TRUMBULL CENTR-A-POWER CONTROL CENTERS

which are of similar construction and line up mechanically and electrically with CENTR-A-POWER Switchboards.

New Free Bulletin—Address The Trumbull Electric Manufacturing Company, Plainville, Conn. Ask for Bulletin TEB-3.

TRUMBULL (T) ELECTRIC

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. . . by a twist of the stem
No complicated adjustments are required to level a Wakefield fixture. Simply grasp the stem and twist! The flared end of the stem rotates freely in the pre-installed strap—the threaded bottom end raises or lowers the fixture. Check with an accurate level as each unit is hung.
With each step in installation designed to be done quickly by one man, Wakefield units save time, save labor and save your customer money on every job. And each step is just as easy—as we'll show you in future ads.
Wide-awake contractors don't say, "Hang the expense!" They say, "Hang Wakefield"
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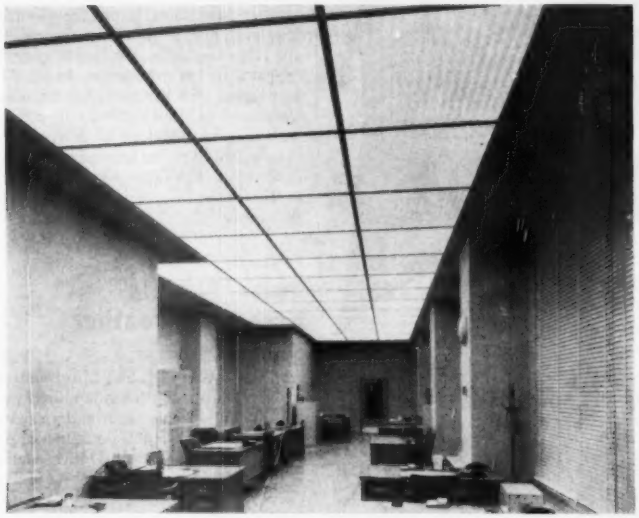


SHADOWLESS and glare-free illumination, of 100 footcandle intensity maintained, is provided by Plexiglas luminous plastic ceiling in sales office of Texas Electric Service Co., Fort Worth, Texas.

Department Store Uses Two-Source Lighting

A combination of 40-watt 4500-degree white fluorescent lamps and swivelling 150-watt R-40 reflector flood lamps provides better than 60 footcandles to merchandise display on the counters of the J. J. Newberry Store, South Broadway, Los Angeles. Lighting units are mounted end to end, with an incandescent flood positioned between each two fluorescent luminaires. Rows are ceiling-mounted on 12-foot centers. As indicated by the accompanying drawing, lines of light are above aisles, so that whatever reflections there are rising from polished objects on the counter are not directed towards customers' eyes. Lighting levels are 68 footcandles directly beneath flood lamps, 60 beneath the fluorescent and 58 half-way between fixture rows.

The fluorescent units, manufactured by the Light Control Company, are fitted with an eggcrate louver having

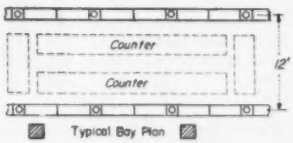
Luminous Ceiling Lights Office

The use of plastic panels to form large area and wall-to-wall luminous ceilings is becoming more and more popular. Another installation of outstanding beauty, which provides excellent quality and high level lighting, has been made in the sales office of the Texas Electric Service Co., Fort Worth, Texas.

The installation consists of 1056 square feet of acrylic plastic panels. These panels, 66 in number, are corrugated white translucent Plexiglas. Each panel is 48-in. by 48-in., corrugated from .125-in. thick material, and weighs approximately twelve pounds.

Individual panels are supported on a metal framework of typical T-bar construction. The corrugations of adjoining sections are run at right angles to form a distinctive decorative pattern. The light-weight, shatter-resistant panels can be turned easily and safely to create different corrugation patterns.

Installed above the plastic diffusing panel ceiling are 33 T-12 slimline lamps and 124 T-8 slimline lamps. The T-12 lamps are operated at 425 ma., and the T-8 lamps at 200 ma. These lamps would produce approximately 110 footcandles in the office, if used without the diffusing panels. Taking into account the diffusion and transmission efficiency of the plastic sheets, an intensity of 100 footcandles is maintained throughout the room. With these readily-removable panels, relamping and cleaning is simplified.



LINES OF LIGHT are above so that, if reflections rise from polished objects, they will not be disturbing to customers inspecting the counters.

COMBINATION of swivelling floods and fan-lovered linear light units provides better that 60 footcandles of illumination to merchandise on display.

Stop costly socket replacement!

NEW Levolier®

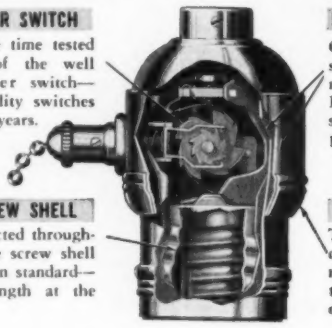
MODEL 4100 INDUSTRIAL SOCKETS

with the proven mechanism of the Levolier switch

Constructed to outlast any socket you've ever used. The new Levolier 4100 Series Industrial Sockets are built with extras throughout . . . extras that eliminate the trouble spots found in ordinary sockets. **Just check these features:**

USES LEVOLIER SWITCH
Incorporates the time tested mechanism of the well known Levolier switch—ultimate in quality switches for over thirty years.

DOUBLE WALL THICKNESS
Cap and casing overlaps resulting in double wall thickness support for the lever. Eliminates cap and casing separation with actuating pull.



HEAVIER SCREW SHELL
Heavily constructed throughout with bronze screw shell .006 heavier than standard—for added strength at the lamp base.

CAP AND CASING LOCK
Threaded collar that locks cap and casing together cannot pass over shade threads to get lost when socket is dissembled for wiring.

In addition, the 4100 Series socket has convenient terminals for easy istallation, universal lever switching action, extra heavy fibre insulating liner. 660 watt-250 volts, with ⅛" cap and lacquered brushed brass finish. No. 4103 has ⅜" cap. Socket failures build up costly time losses in industrial applications. Avoid frequent replacement with the dependable Levolier No. 4100. Underwriters' Laboratories, Inc. Inspected.

Model 41 LEVOLIER SWITCH Here is the switch that is now unconditionally guaranteed when used in lighting circuits. Levolier Model 41, 6 amp. "T" rated 125 volt switch is Underwriters' Inspected. Especially suited to fixture canopies and fractional horse power motors. Only ⅝" thick. Brass, dark bronze or burnished nickel finish.

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McGILL® electrical specialties

ONLY McGILL MAKES Levolier SWITCHES

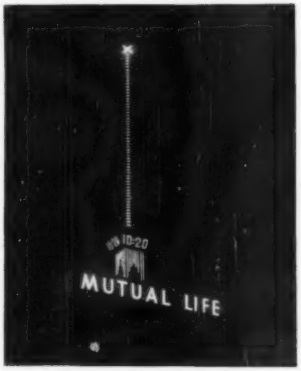
longitudinal fins fanned in an arc. One advantage to this arrangement is that, regardless of the direction one looks from, it is impossible to see more than a single lamp. While it is true that, conversely, one lamp is usually visible, the ceiling height of 15 feet is sufficient to keep brightness below the disturbing level and a survey of customers and store employees resulted in general approval of the installation. In all, 372 fluorescent and 195 incandescent units were used to illuminate the first floor with a connected load of 5 watts per square foot. The basement is similarly lighted but with wider spacing of rows so that intensities are approximately 53 footcandles.

Color Signals Forecast Weather

An illuminated Weather Star, built atop the 25-story Mutual Life Building in New York, will provide quick, visual, and up-to-date information about expected weather conditions. Based on hourly reports from the United States Weather Bureau, the star will relay the forecasts of weather and temperature for the metropolitan area by changing color.

The star is at the top of a 150-foot steel tower. Made of stainless steel and covered with ¾-inch plastic skin, the star will contain 300 lamps, will be 10 feet broad and weigh over half a ton. A steady orange signal will forecast clear weather, steady green will predict cloudy conditions, and flashing green will signal rain. Photo-electric relays will automatically switch on the star whenever the signals can be clearly seen.

At the base of the tower, "jump" clocks with numerals 7½-feet high will



WEATHER STAR atop new Mutual Life Building will predict weather for New York area by changing color signals.

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the one source lighting line

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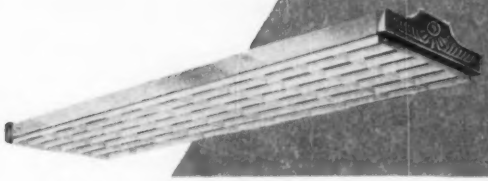
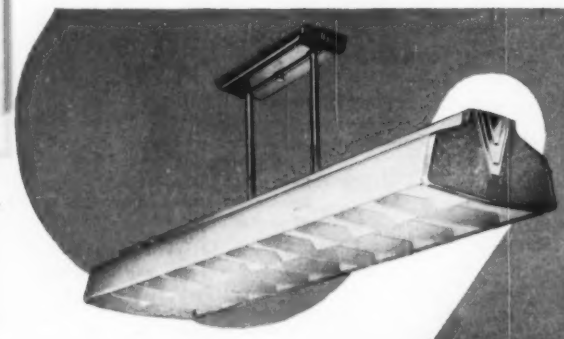
SELLING TOOL



You'll find the new Kayline Catalogue #50 one of your best tools for selling modern lighting. It's full range of incandescent, fluorescent and slimline residential, industrial and commercial lighting fixtures will meet your every need. They will assure you of customer satisfaction. Send for Kayline's Catalogue #50 today!

See Sweet's Architectural File Section 31A-12



THE KAYLINE CO
2480 EAST 22nd STREET
CLEVELAND 15, OHIO

KAYLINE
the one source lighting line

face each of the four sides. The numerals will be lighted by 2,500 lamps and each lamp set in a "cup" 3 inches deep.

Running like a ladder between the clocks and the Weather Star will be sixty bands of about 20 lamps each. These bands will act as a vertical sweep second hand, one band lighting up every second. When sixty seconds have passed, the ladder will black out and the clock will "jump" to the next minute.

If the "sweep" of light is from bottom to top, rising temperature is expected. When the "sweep" is from top to bottom, falling temperature is predicted.

Nine-foot high letters, lighted by gold neon tubing, spell out Mutual Life on each side of the building.

This display will use a total of 4,200 lamps, 3,500 feet of neon tubing, 17,000 feet of wiring, and 85 high voltage transformers. Each lamp will be replaced after 2,000 hours of use.

Plastic Pans Light Lobby

Large one-piece plastic diffusing pans, semi-recessed in the ceiling, are used to light the elevator lobby in the new annex building of the Pennsylvania Company for Banking and Trusts in Philadelphia. Equipped with fluorescent lamps, the pans are uniformly lighted and provide glare-free, low-brightness-ratio lighting.

These diffusing pans are 36 inches square, and are formed from single sheets of .250-inch thick Plexiglas to a depth of 3-3/16 inches. The Plexi-

SHALLOW SEMI-RECESSED ceiling units, three feet square, with one-piece Plexiglas diffuses, light the elevator lobby of the Pennsylvania Company for Banking and Trusts new annex building in Philadelphia.

This

Low-Brightness *Installation means High-Level Seeing Comfort*

AT THE HARTFORD CONNECTICUT TRUST COMPANY

Seeing comfort is high in this Hartford, Connecticut bank. One reason, of course, being the high intensity level . . . an average of 60 footcandles initially. Yet brightness levels are exceptionally low both lengthwise and crosswise. The result is a well-lighted working area that keeps the seeing and working efficiency of employees high . . . that gives a light, cheerful atmosphere, attractive to customers.

Whenever you have a lighting problem — unusual or standard — call on your nearest Litecontrol representative. He'll be glad to assist you in every way.

HARTFORD CONNECTICUT TRUST COMPANY, Hartford, Connecticut

Architect:
Kilan & O'Connor, Hartford.

Lighting Engineer:
Hurley & Capocefalo, Winsted.

Lighting Equipment:
Litecontrol No. 5938 recessed. Slimline fixtures with Holophane No. 9015 CONTROLENS.*

Average Initial Intensity:
60 footcandles.

*®HOLOPHANE CO., INC.

●

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AUSTIN Top Quality, Low Cost, Easily Installed, PORTABLE LIGHTING UNITS

Meets the demand for more adequate light. For all outdoor spot and floodlighting jobs — quickly, easily and economically installed. Completely packaged for your convenience.

LS-5
150 watt lampholder mounted on sturdy metal spike for nailing to side of building, post or tree, or inserting in ground. Complete with 5' cord and plug.

LS-10
Same as above, with 10' cord and plug.

LC-2
150 watt bracket type lampholder complete with combination cover for mounting on 3¼" or 4" octagon box, post or wall. Includes 20" of portable cord with stripped and tinned leads. Cover has knockouts to fit box ear centers and to allow cord to enter box.

LC-5
Same as above, with 5' cord and plug.

CLD-150 LAMPHOLDER
150 watt lampholder with "floating socket" which moves forward or side to side in an eccentric plane to compensate for variations in size and shape of lamps, sockets or castings. Insures tight seal and positive electrical contact. Completely wired. Patent applied for.

CLD-35
Same as above for 300 and 500 watt mogul base lamps.

CPB-150
CLD-150 "floating socket" lampholder mounted on PB-½ wall or pole bracket having 2 porcelain insulating tubes to protect leads.

COMBINATION UNIT
CLD-150 "floating socket" lampholder mounted on a CO-1 cover with ½" threaded hub in center. Cover fits 3¼" round ceiling pans, 3¼" and 4" octagon boxes and concrete boxes. Provided with knockouts to fit box ear centers and to allow cord to enter box.

CLD-sp-150
CLD-150 "floating socket" lampholder mounted on sturdy metal spike, with 10' cord and plug.

CLD-sp-35
Same as above, with CLD-35 "floating socket" lampholder for 300 and 500 watt mogul base lamps.

The M. B. Austin Company
NORTHBROOK, ILLINOIS

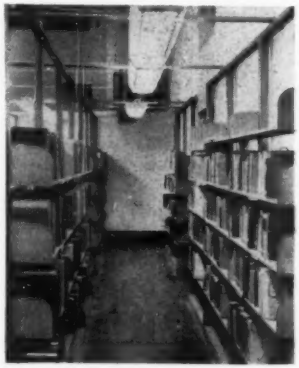
Write for Information and Prices

glas is white translucent color No. 122-125

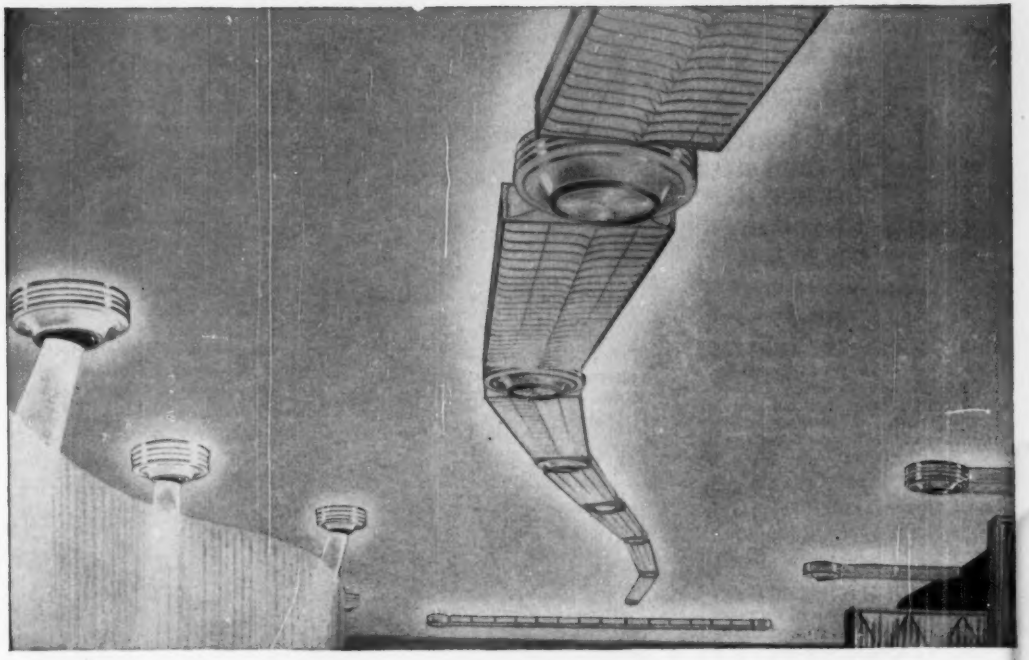
Each lighting unit contains six evenly spaced 30-watt, 36-inch long fluorescent lamps installed four inches above the inside surface of the diffusing plastic pans. These are installed in a metal housing in which the entire inside surface is finished white and serves as an efficient reflector. Provision is made for the safe and easy removal of the light-weight, shatter-resistant diffusing pans, to permit access to the lamps and housing for maintenance and relamping. These units, fabricated by Amplex Manufacturing Company, Philadelphia, were installed by H. P. Foley Company, electrical contractors.

Library Shelves Have High-Level Illumination

Checking titles of books, selecting reference volumes, extracting data or replacing printed material in its proper indexed position is performed with maximum accuracy and speed in the Gentilly Branch of the New Orleans Public Library because of the intensity and position of the lighting in the book-stack sections. Luminaires are suspended just above the heads of those using the stacks, at a height of 7 feet, resulting in vertical footcandle intensities of 37.5 ft-c on the upper shelves, 31 on the second, 16 on the third, 5.5 on the fourth and 5 on the bottom tier. Since people selecting books normally bend or stoop to inspect books at lower levels, there is never a problem of shadows being cast by the heads or shoulders of readers. Also, since people normally stand upright to open and scan through a selected volume, illumi-



FIXTURES, mounted directly to framing struts at a height of 7 feet above the floor, provide 37.5 footcandles on vertical bindings of books stored on upper tiers.

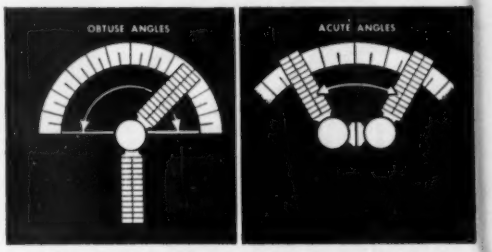


Now you can "do things" with lighting, too!

Buy PLEXOLINE!—sensational new mass-produced lighting system with "flexibility." Simple combinations of Plexoline's linear and circular units produce any lighting patterns your imagination can invent. Graceful curves of light . . . circular contours . . . angular patterns . . . abstract designs . . . and more!

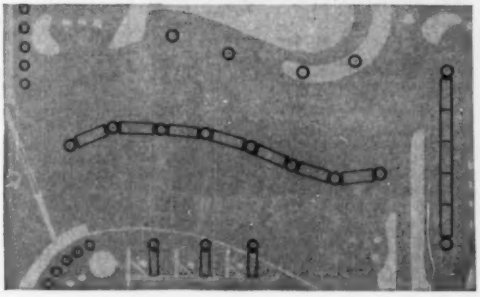
Best of all, Plexoline delivers this truly custom-tailored lighting *at standard cost*. It's modern lighting with all the traditional economies of Day-Brite QUALITY; Plexoline is carefully designed and produced to insure long years of trouble-free, efficient service at the *lowest* possible installation, maintenance and operating cost.

But you need the full PLEXOLINE story to properly judge its amazing advantages to you. Send for your free copy of "Plexoline — Imagination at Work." Day-Brite Lighting, Inc., 5402 Bulwer Ave., St. Louis 7, Mo. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.



Plexoline is simple. No intricate wiring arrangements, no costly installation problems. All parts are uniform, fit accurately. Linear sections are available in a variety of lengths, 2- and 4-lamp, Slimline and standard Fluorescent. Circular units available as adjustable accent units.

Now you Can DESIGN LIGHTING to Fit your Floor Plan!



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ONLY $11.50
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TIME SWITCHES for CONTROLLED LIGHTING that brings them $20.80 more egg income per 100 Layers every year!

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Nationally advertised. For any Poultry-House Lighting Schedule, for any size of flock,

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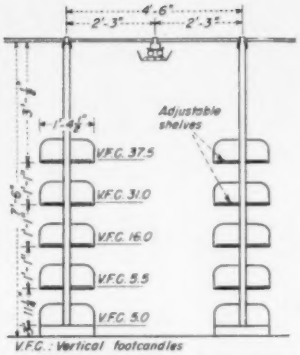
AMERICA'S FOREMOST EXCLUSIVE MANUFACTURER OF TIME CONTROL SWITCHES FOR ALL USES



LIGHTING UNITS in the book-stall sections are 2-lamp 40-watt fixtures. Fixtures in other sections of the library are mounted to the 14-foot ceiling and are 4-lamp assemblies.

nation at normal eye level is sufficient for casual reading.

The fixtures, named the Airliner and manufactured by the Fluorescent Corporation of America, were installed by the Lighthouse Electric Company directly to the cross braces between the tops of the shelving frames. Conduit and boxes were run exposed but, painted the same color as the shelves and struts, blend with the surrounds. Aisles are on 4.5-foot centers, with luminaires suspended directly over center lines. Ceilings are painted flat eggshell, while end walls are painted coral to add warmth to the invirons and minimize brightness in the direct line of sight of readers. Luminaires are 2-lamp 40-watt units with eggcrate-louvered bottoms, luminous side panels and open tops. Ceiling height is 14 feet.

DEEP WOODEN LOUVERS beneath slimline lamps operating at 200 milliamps and positioned end-to-end on 12-inch centers produces pleasing cut-off angles and general diffusion of the 100-footcandle intensity illuminating desk surfaces in the private office of E. C. Hinck, Jr., Illuminating Engineer of Montclair, N. J.

Slimlines and Deep Louvers Furnish 100 FC in Office

Diffuse illumination in the order of 100 footcandles is obtained in the private office of E. C. Hinck, Jr., Illuminating Engineer of Montclair, N. J., through the application of slimline lamps and deep, large-cell louvers. Louvers consist of 12-inch boards, arranged on a 12-by-14-inch grid pattern, with the lower edges suspended 9 feet above the office floor. Above this grid, 8-foot T-8 slimline lamps, operating at 200 milliamps, are spaced on 1-foot intervals, and lamps are mounted end-to-end to create continuous lines of light in this area. An even 100 footcandles of illumination is delivered to desk tops by these 4500-degree white lamps, and the entire tone of the room is maintained at this high-key level by the advocation of bleached wood desks and light reflecting finishes and furnishings on the floor, walls and over the windows. Designed by Mr. Hinck, Jr., in conjunction with the decorating plan of Phillip Schroedel of Upper Montclair, the resulting installation is an excellent example of a recommended treatment in an office of this type. Edmund R. Stearns, Inc., of Glen Ridge, was the general contractor and engineer, while Leo Filkin, of Bloomfield, N. J., performed the electrical work.

* NON-WARPING
ELECTRO LUSTREX Styrene Louvers are guaranteed to remain warp-free under ordinary conditions of use.
* DURABLE
ELECTRO LUSTREX Styrene Louvers resist chipping and cracking... give extra years of service.
* MORE ATTRACTIVE
Sparkling white ELECTRO LUSTREX Styrene Louvers are guaranteed against discoloration for life under normal use.

ELECTRO fluorescent fixtures

now let you safely specify the added shielding advantages of

LUSTREX* styrene

Added light—added beauty—and added assurance of complete satisfaction are all now available in ELECTRO commercial fluorescent luminaires with LUSTREX Styrene louvers. Only ELECTRO Lustrex Styrene Fluorescents offer these better lighting features:

- **Guaranteed against warping and discoloration under normal use for the life of the fixture.**
- **No light loss! Translucent side panels transmit light—do not trap it.**
- **Louver panels are moulded—not just interconnected—for added rigidity and superior conformation...the dimensions of the openings remain constant!**

CHOOSE FROM A COMPLETE VARIETY OF SMARTLY STYLED, MODERN COMMERCIAL FIXTURES...featuring the ELECTRO "Basic Unit," the exclusive engineering idea that permits easy interchangeability of luminaires.

ALSO! LUSTREX STYRENE IN A COMPLETE RANGE OF SLIMLINE MODELS.

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In the News

Washington Roundup

Highlights of defense production and economic controls and their effect on the electrical construction industry.

Now that the military struggle in Korea is near successful termination, economic and defense production controls and regulations at home will not be eased. Instead, they will gradually become tougher. The long-term objectives for rearmament, while maintaining a minimum impact on our national economy, makes this an apparent and understandable fact.

Control agencies established under the powers of the Defense Production Act of 1950 are now organized. While these agencies are still woefully understaffed, they are all working feverishly on their respective problems. Main objective of DPA is to see that military orders get filled first and on time, then to see that essential civilian uses come ahead of non-essential. Each agency, working within the sphere of its delegated authority, has already issued or will issue when needed, appropriate controls and regulations.

Curbs imposed upon business up to now have been relatively few, and in general, fairly soft. But as defense production runs into snags, such as shortages of materials and skilled labor, controls will increase in number and become tougher. The big impact is expected by sometime early next year.

Some of the more important controls issued and put into operation up to now include:

Federal Reserve Board's Regulation W and Regulation X—credit curbs.

Regulation W ups down-payments and reduces time to pay off balances on consumer goods. Examples: autos—one-third down; appliances—one-fourth down; furniture—15 percent cash; all with 15 months only to pay off the balance.

Regulation X sets up a tough credit policy on residential housing. Initial down payments have been upped sharply. On houses costing up to $5000, minimum down payment for non-veterans is ten percent. Percentages rise progressively with the value of the dwelling up to 41.5 percent for a $20,000 house, plus 90 percent for excess over $20,000 up to a 50-percent-of-the-house-value maximum.

National Production Authority's Inventory Control order (NPA Reg. 1), and Priorities Regulation order (NPA Reg. 2), and a construction controls order, (NPA order M-4, Construction).

NPA Reg. 1, Inventory Control, clamps inventory limitations on a number of building materials and metals in short supply (EC&M, Oct. 1950, p. 161).

NPA Reg. 2, titled, "Basic Rules of the Priorities System", gives defense orders top priority. It directs manufacturers to schedule defense work ahead of everything else. It uses a single band rating, known as a "DO", for Defense Order, rating. Only Department of Defense and Atomic Energy Commission purchasing officials are authorized to assign "DO" rating priority numbers to contracts covered by the regulation.

NPA officials know Regulation 2 doesn't go far enough. Together with other mobilization agencies they are already planning to channel materials into essential civilian needs—industrial plant expansion, for one, transportation, for another. Also, they know more priorities won't help in cases of extreme shortages, such as aluminum, copper, steel. Real controls—allocation, limitation of use—will be needed quickly as large military orders actually get under way. Such controls may be expected, some by year's end, others early in 1951.

NPA has issued a Construction Controls order (M-4—Construction). This order became effective October 26 at midnight, and bans construction of new theatres, night clubs, country clubs, race tracks and some 40 other types of structures for amusement, recreation and entertainment—all in the nonessential category.

This order is the first really severe restriction imposed on the economy as a result of the Korean crisis and current rearmament program, insofar as the electrical construction industry is concerned. It does not affect construction already under way, and allows repair and maintenance of existing buildings. It also permits construction jobs costing not more than $5000 for any 12 consecutive months, and all Department of Defense and Atomic Energy Commission construction.

NPA warned that anyone who starts construction not prohibited by the present controls order, which does not further the defense effort, runs the risk of having it halted. It also warned it will outlaw other non-essential construction if necessary.

IAEI PRESIDENT John E. Wise, Madison, Wis., meets John T. Carey (right), chief electrical inspector of Honolulu and Chairman of the Hawaiian Chapter, IAEI at Western Section meeting in Detroit.

SURPRISE MEETING at Detroit inspectors convention brought together former Michigan electrical inspectors Harry Burbridge, Kalamazoo; and Carl D. Mason, Howell, with R. S. King (right) chief electrical inspector of Flint, Michigan.

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Patents Pending

INSTANT START... LONG LIFE... DEPENDABILITY!
For single phase, split phase, or capacitor fractional hp single or dual voltage motors.
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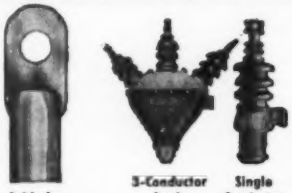

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Major cutback in electrical construction from regulations already issued will result from the curtailment of residential housing due to Regulation X credit curbs. FRB's objective is a reduction of 1950's peak 1.2-million residential starts to about 800,000 dwellings in 1951. Home builders fear present controls will cut 1951 housing far below 800,000 units.

Curtailment of electrical construction work through fewer housing starts will be more than offset by a shift to a stimulated non-residential construction activity.

For the building industry as a whole, 1951 now promises to be a good year, although not up to the 1950 level. Estimates made before NPA issued its construction controls point to a $24-billion total for 1951, as compared to about $26.5-billion for this year. The resulting electrical construction requirements in 1951 may exceed this year's needs, since the shift is from homes to factories, and since the electrical construction dollar in relation to the building construction dollar is much less in residential housing than in commercial and industrial construction. The NPA's new Construction Controls order may cut the 1951 estimate still further, however.

There are many other Washington "straws in the wind" of interest to the electrical construction industry, since they indicate in some cases an expanded market for electrical construction and maintenance and repair, either directly or indirectly, and in other cases a cutback in those fields. Here are some of the more important:

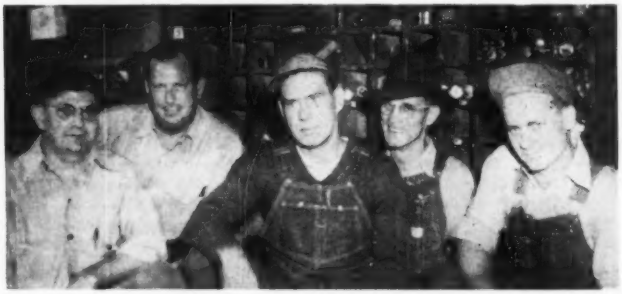
● National Production Authority has issued NPA order M-1, Steel, which sets forth specific rules for the placing, accepting and scheduling of orders for various steel products which have been assigned a "DO" priority rating. This order is designed to maintain maximum steel output and to reduce possible disruption to other steel users by providing for economic scheduling and equitable distribution of the "DO" rated orders among steel producers.

● At the request of Secretary of Commerce Charles Sawyer, the steel industry has made available its steel expansion plans, through the American Iron and Steel Institute. Plans are to expand its annual capacity to a total of 109,963,000 net tons by the end of 1952. This represents an increase of 9,400,000 net tons over its July 1, 1950 capacity of 100,560,000 net tons. These are not hopes, nor idle dreams, but actual commitments for the future, Secretary Sawyer stated.

When it is realized that it takes about three tons of steel to provide for a one-ton expansion in annual capacity, it is evident that this program alone will use a sizable chunk of the steel output during the next two years. Department of Interior, through C. Girard Davidson, assistant to Secretary Chapman, is stumping for a 20-million-ton expansion in steel capacity, more than double that agreed on by the producers.

● A two-billion-lb. a year boost in aluminum production, one and a half times the present capacity of 1.4-billion lbs., is being called for now by Stuart Symington, chairman of the National Security Resources Board. Big catch in adding this much production capacity for aluminum is the need for vast amounts of cheap electric power. It requires ten kwh. of direct current power to produce one pound of aluminum ingot. Electric utilities generate ac current. Conversion from ac to dc is possible, but expensive.

● The newly organized Defense Transportation Administration is asking NPA for steel allocation for building 100,000 new freight cars, now on order by the railroads, plus some troop



THEIR JOB is to keep electrical systems and equipment in top operating condition at the diesel engine plant of Caterpillar Tractor Co., Peoria, Illinois. Day shift crew includes: (L to R) Philip Dini (general maintenance); Edward Hamilton (heat treat); W. L. Swafford (power and circuit identification); Vern Smith (general maintenance); and Merton Koch (heat treat).

ELECTRICAL INSPECTORS George R. White (left), Grand Rapids, Mich.; and John C. Denner, Saginaw, Mich., exchange field experiences during inspector convention.

carriers of World War II type needed by next spring. Needs for freight cars are already being upped to 150,000 on most recent estimates. This program will require about 300,000 tons of steel monthly for a production of 10,000 cars monthly.

● Industrial building in 1951 is expected to increase at least 50 percent above this year's figures.

● Atomic energy spending will increase from $200-million this year to about $450-million next year.

● Radio, television and consumer goods industries have been warned by NPA that it has "tentative" plans for restrictions in civilian use of nickel, copper and aluminum. NPA also warned that cobalt, an alloy used in electronics production, may be completely barred for all but military defense production.

● Draft policy is gradually being stabilized and clarified. Employees between the ages of 19 and 25 will probably be drafted in the next year if they are physically fit. Those 26 to 35 are not expected to be drafted in the "foreseeable future". And employees over 35 will not be drafted, short of an all-out shooting war. With the draft limited to men under 26, few in this group will get occupational deferments.

Inspectors Hold Sectional Meetings

Members of the International Association of Electrical Inspectors journeyed to various parts of the country for their annual conferences on electrical inspection problems and code interpretations. The round of Section meetings began with the Northwestern group in Seattle, Washington, Sept.

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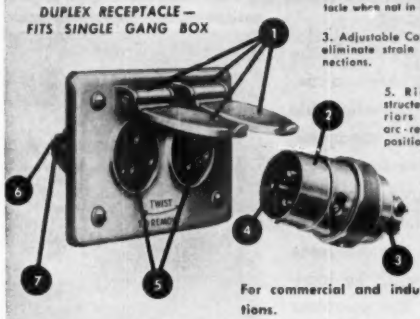

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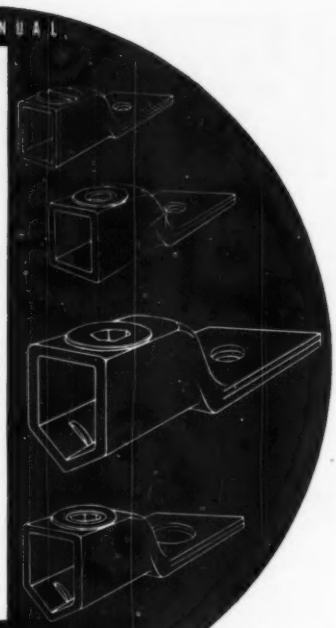

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CODE RULES on hazardous locations get thorough airing by C. M. Park (left) chief engineer, Mill Mutual Fire Prevention Bureau, Chicago; and V. C. Moulton, electrical engineer, Mountain States Inspection Bureau at Denver, during recent Western Section, IAEI conference.

11–13. Following in close order were the Southwestern Section at San Jose, California; Eastern Section at Buffalo, N. Y.; Western Section at Detroit, Michigan; and the Southern Section at Daytona Beach, Florida on October 16–18.

Featured on the agenda at each meeting were the National Electrical Code Panel reports covering proposed 1951 amendments to the NEC and a discussion of the revised 1950 Correlating Committee Report. In general Sections approved the Panel and Correlating Committee Reports. Notable exceptions took place at the Buffalo meeting where objections to the proposed substitution of the words "tamper-resistant" for Type S in Articles 2452 and 2453 were voiced. Inspectors wanted to retain the present NEC terminology. Similar action took place at the Detroit meeting. Eastern inspectors also objected to proposed changes in Article 510 defining limitations of hazardous locations in below-grade garage areas. Again they wanted to retain present Code wording.

International secretary-treasurer Charles L. Smith, Chicago, brought all Sections up-to-date on plans for membership categories. One new Type F "participating" membership is gaining support. Smith reported that more than 100 municipalities have joined the Southwestern Section under this plan and he hopes others will follow suit. Plans for another new Type E "cooperating" membership for large industry groups (NEMA, NECA, U.L., etc.) are now being formulated, he added. Mr. Smith also revealed that the new 1951 Edition,

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We all know unreasonable generalizations can be dangerously false. Common sense and on-the-job experience show us the value of dealing specifically with ideas, problems—and *people.*

Let's not make the big—and costly—mistake, then, of generalizing on religious or racial groups. Adopt and *carry out* these common sense principles:

1. Accept—or reject—people on *their individual worth.*
2. Don't listen to or spread rumors against a race or a religion.
3. Speak up, wherever we are, *against* prejudice. Work for understanding.

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WESTERN SECTION OFFICERS of International Association of Electrical Inspectors elected at recent Detroit convention are: (L to R) 2nd vice-president—J. C. Denner, Saginaw, Mich., president—O. E. Radtke, Cleveland, Ohio; 1st vice-president—H. L. Parks, Charleston, W. Va.; secretary-treasurer—F. H. Moore, Indianapolis, Indiana.

NEC, will be printed with an appendix including all wiring requirements from other standards on special occupancies, etc., which are not now covered in the Code.

In his President's address, International president John E. Wise, Madison, Wis., outlined the need for revision of the Association's Articles and by-laws to meet present day operation; urged inspectors to give careful consideration to, and maintain open minds regarding, acceptance and development of new methods and devices. Wise warned against assumption of dictatorial attitudes regarding promotion and securing of uniform administrative ordinances and inspection methods. The electrical inspector should act as a guiding hand and make recommendations in this respect, he added. Mr. Wise recommended a continued program of education regarding installation and use of electrical equipment; wholehearted cooperation between inspectors and inspection departments of the electrical industry and the public.

NEMA's justification for unlisted control equipment for industrial applications was presented in a paper read at the various section meetings. E. G. Forgy of Westinghouse gave the eastern inspectors the answer; F. A. Wright, Cutler-Hammer, Inc., Milwaukee enlightened the western section group. Both men emphasized that lack of Underwriter's listing does not mean lack of safety. While standard control devices are tested and listed, it is economically impractical to submit the multitude of variations of magnetic switches, tailor-made control centers and other special control applications for listing. Many are so-called "one-shot" applications and not duplicated. All are built to the same exacting standards as the mass-produced items listed by Underwriter's, the speakers revealed.

Speaking as a representative of the Gas Appliance Manufacturer's Association, C. W. Nessell, Minneapolis-Honeywell Regulator Co., brought the low voltage automatic temperature control wiring problem before the inspector groups. Specifically, his association believes some sections of NEC Article 725 to be unrealistic and unnecessarily rigid when applied to control equipment on domestic gasfired central heating equipment. He asked for modification or clarification of the Code rules and a sympathetic understanding of their position until the problem is resolved. Nessell revealed the results of an investigation in major cities; added that they have found a non-inflammable, abrasion-resistant, high dielectric strength cable to replace the standard cotton-covered, wax-impregnated conductors now being used.

Coast Section Highlights

At inspector conventions this year it is the 20-amp., No. 12 circuit and the tamper-resistant fuse proposed by the Edison Electric Institute for revision of the National Electrical Code, that is the question before the house.

The Northwestern Section International Association of Electrical Inspectors, annual meeting, at Seattle, Sept. 11-13, after debating it vigorously, turned down the Correlating Committee NFPA report on these two changes by a vote of around 4 to 3. It also went on record again demanding that the Type-S fuse be made mandatory as it has so often voted in the past.

The Southwestern Section dodged discussion of the proposed changes to the code relative to 20-amp. circuits but attacked the problem from a more fundamental basis. It went after the overcurrent protective device itself—fuse or circuit breaker. In revisions proposed by its own committee for Article 240, it asked for revision of the standards for overcurrent devices

to provide both time-delay for motor starting on 15- and 20-amp circuits and instantaneous clearing of the circuit on short circuit current over 100 amp. For range circuits it also asked instantaneous circuit clearance on any current over 100 amp. With such protection the circuit wire size would become no problem. On the proposal of EEI for another tamper-resisting fuse besides the Type-S, the Southwestern Section voted a strong no. It would only add to the already confused situation, they argued.

The Southwestern Section also repeated its request for a change in the code to require switches to disconnect signs and outline lighting right in the sign or in such location as to permit safety for the man servicing a sign. And the oft repeated request was made again to change the code to provide protection against accidental contact with crane contact conductors. And unless Art. 670 is amended to include woodworking and other multi-motored tools the Section voted to wipe the entire machine tool article from the code.

L. B. Garff, Tacoma inspector, presided over the Seattle meeting in the absence of D. J. Wolters of Salt Lake City, section president. Garff, who was vice-president, was elected new president of the Section; Chris Klawa, Portland, first vice-president, and Harold Rising, Boise, second vice-president; W. L. Gaffney, Tacoma, reelected secretary-treasurer. Next year's convention will be held in Spokane.

At the Southwestern Section, R. W. Maxwell, San Jose inspector, who was president for the meeting there, was

INSPECTING NEW SnapX connector at Western Section IAEI convention exhibit in Detroit are H. W. McInerney (left) and John E. Henselwood, Toronto inspectors for the Approvals Division, Canadian Standards Association.

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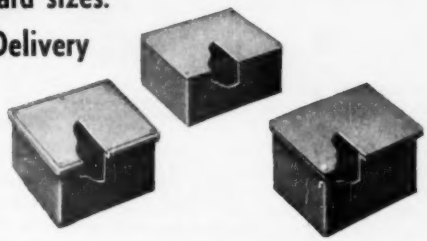

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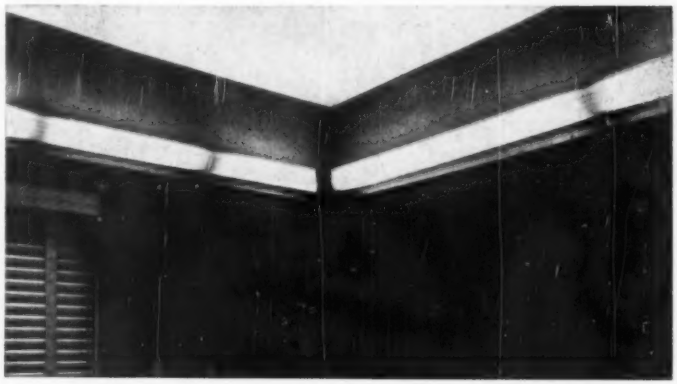

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WINNING A POINT during lobby session at Western Section IAEI conference in Detroit is W. J. Allen (right) chief electrical inspector of the Canadian Underwriters Association, Toronto. Conceding are C. M. Jones (left) and W. P. Smith, Underwriters Laboratories, Toronto.

succeeded by Ed V. Muller, electrical safety engineer, California Department of Industrial Safety. R. D. Johansen, Alameda inspector was made first ice-president; C. R. Meilel, Bakersfield, second vice-president and H. G. Ufer, Underwriters Laboratories, reelected secretary-treasurer. Hawaiian Chapter, fastest growing in the Section was recognized by an amendment which gave it a place on the executive committee. John Thomas Carey, Honolulu inspector, was named to that place. Long Beach was selected as next years meeting place.

Eastern Section Highlights

At the Buffalo meeting, eastern section president, B. B. Whelan of Boston, felt that local electrical inspectors were best able to judge requirements which might vary with the NEC; fostered the right of inspectors to participate in promulgating standards for local conditions.

Both E. A. Brand, NFPA Member, Electrical Section Correlating Committee, and Merwin Brandon, vice-president, Underwriters' Laboratories, emphasized the value of the NEC as a national standard which permits a wide acceptance, safe use and mass production of electrical products. Brandon believes the electrical inspector should have the priviledge of interpreting the Code as applied to his local community and problems. NECA president Edward Vanderlinde stressed the value of the Code as an installation standard for electrical contractors throughout the country.

The dynamic advancing electrical industry presents a challenge in vision of the future and acceptance of our part in its progress, W. T. Stuart, editor, *Electrical Construction and Maintenance*, told the Buffalo group.

The inspectors' responsibilities are to protect the public from evils inherent in a powerful energy, whether an installation be in a new structure or in an old building, he added. To overcome a natural reluctance to make expensive alterations in an old building, Stuart recommended a *voluntary reinspection program* in which the inspectors' role is advisory and unofficial. Such a program, coupled with contractor selling and a proper education and public relations job should do much to overcome the inherent balking to an official and mandatory approach.

As for rural America, T. P. Branch, REA Power Utilization Specialist, related the need for reinspection and re-wiring of practically all rural wiring installations connected to hi-lines prior to 1945. Northwestern and Eastern Section inspectors were given the details of a new REA power use and cooperative education program designed to pave the way for better initial and reinspection of farm wiring. B. J. Mulvey, General Electric Co., discussed applications of Parkway and neoprene jacketed cables.

Western Section Highlights

At the Detroit meeting, Western Section members heard Fred A. Compton, vice-president, Detroit Edison Company, caution against formulating highly restrictive legislation and rules and regulations which might tend to stifle competition. Compton described the role of each branch of the electrical industry and its responsibility to the public; pointed up the *electrical contractors* as the one group who sees the necessity for adequate safety regulations but also sees the need for development of new methods and materials as well as modification and elimination of obsolete regulations. He urged those present to give wiring problems immediate attention; develop a program

WORKING DILIGENTLY at Western Section IAEI convention in Detroit are: (L to R) Clifford Anderson, Oklahoma Inspection Bureau, Oklahoma City; and S. R. Todd, electrical inspector of City of Chicago.

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NFPA GENERAL MANAGER Percy Bugbee, Boston, explains the organization and operation of the National Fire Protection Association to western electrical inspector conference.

to enhance public acceptance of safety measures; secure safety through use of more adequate and economical materials and methods.

At the general sessions, Percy Bugbee, general manager, NFPA, Boston, outlined the history and operation of the National Fire Protection Association. Curtis Welborn, president, Underwriters' Laboratories, Chicago, discussed the part UL plays in the industry. G. A. Berthel, Jefferson Electric Co., Chicago, presented a history of the development and application of fuses as circuit protective devices. In discussing Pressure Switches as Service Switches, E. C. Soares, Industrial Engineering Services, New York, brought up a subject that was new to inspector groups. He described the design, construction and operation of bolted pressure contact switches using the Type X aluminum-alloy fuse.

"You pay for wiring whether you get it or not" was the theme of an unusually interesting demonstrated talk by J. L. Wagoner, Westinghouse Electric Corp., East Pittsburgh. By means of an ingeniously contrived board depicting the wiring system of an industrial plant, Wagoner gave the inspectors a visual lesson on what happens when low voltage and inadequate copper capacity strangle a distribution system; also what remedial steps to take. Electrostatic Finishing Processes was the subject of a film presentation by Harold P. Ransburg, vice-president, Ransburg Electro-Coating Corp., Indianapolis.

Of fires due to electrical origin in Chicago, Detroit and Boston (cities reporting) a combined total of 39.8 percent were caused by motor winding burnouts; 13.4 percent due to defective electrical cords; and 10.2 percent due to heating appliances left in circuits unattended, stated Kent P. Stiner, Detroit, urging investigation of overcurrent protection on motor circuits.

The International Association of Electrical Inspectors has a grand total of 7,085 members reported Fred P. Oliver, co-chairman IAEI membership committee. Of all Sections the Western Section is the largest with more than 2,300 members and 14 Chapters in 19 states and Canada. Latest to be added to this roster is the Michigan Chapter with 330 members.

Accorded Honorary Membership status at the Detroit meeting were F. H. Moore, Indianapolis, secretary-treasurer of the Western Section; and Arthur G. Hall, advisor to Chief Electrical Inspector, Hydro-Electric Power Commission, Toronto, Canada.

Highly favored by inspectors was the extended time allotted on Section programs for Code Discussions. Unlike other years, about 50 percent of the session time was open for inspector problems, code interpretations and general question and answer periods. Indications are that future meetings will give even more time to this exceptionally important conference item.

At the business sessions of the various Section conventions the following officers were elected:

Northwestern Section. President—L. B. Garff; first vice-president—Chris Klawa; second vice-president—H. W. Rising; secretary—treasurer—W. L. Gaffney.

Southwestern Section. President—E. V. Muller, Los Angeles; first vice-president—R. D. Johansen, Alameda Calif., second vice-president—C. R. Meikel, Bakersfield, Calif.; secretary-treasurer—H. G. Ufer, Los Angeles. John T. Carey, chairman of the Hawaiian Chapter, was elected a member of the Executive Committee.

Eastern Section. President—Bart F. Greene, New York City; first vice-president—L. J. Wylie, Hartford, Conn.; second vice-president—F. Stetka, Washington, D. C.; secretary—F. N. M. Squires, New York City; treasurer—F. H. Moore, Indianapolis, field, Mass.

Western Section. President—O. E. Radtke, Cleveland, Ohio; first vice-president—H. L. Parks, Charleston, W. Va.; second vice-president—J. C. Denner, Saginaw, Mich.; secretary-treasurer—F. H. Moore, Indianapolis, Indiana.

Form Suburban Inspector Group

With an eye toward standardization of local electrical code requirements, inspectors from suburban communities surrounding Chicago recently organized the Suburban Division of the Illi-

SPECIFY Simpson for accurate Dependable electrical Measurements!

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nois Chapter, IAEL. The new group will cover an area within a 30 mile radius of Chicago (the city itself is excluded).

Knowing that regulations and problems differ in the various municipalities, these inspectors wanted to meet more frequently than the biannual meetings of the Illinois Chapter. Plans at present are to meet at least every other month, possibly monthly if occasion demands.

Chairman of the group is J. Gordan Maltby, chief electrical inspector of Evanston, Illinois.

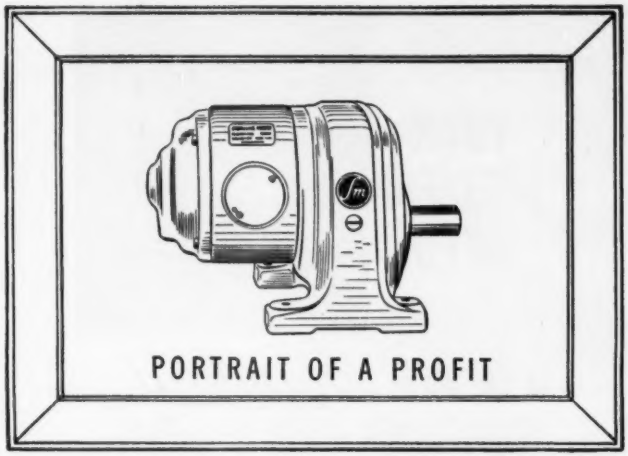
Reports indicate there is a growing tendency to split up large state Chapters into much smaller groups to permit more frequent meetings of interested inspectors and discussion of problems pertinent to those operating in smaller localities. This is already being done in the states of Iowa and Washington and there is a possibility that New York will follow suit.

Production Stressed At League Meeting

Necessity for an accelerated rate of production was the common ground for two principal speakers at the annual meeting of the International Association of Electrical Leagues in Boston, Oct. 11-14. But from that ground they went different ways.

Dexter Keezer, McGraw-Hill economist, saw increased production as about the only deterrent of a desperately dangerous inflation ahead, which will be promoted by military and foreign-aid spending and by the coming excess profit tax. Neither credit restrictions nor price and wage controls will be effective in stopping or even retarding the inflationary trend, he said.

Arno H. Johnson, research director of J. Walter Thompson Co., took a more cheerful view. Actual purchasing power for civilian goods, after correction for taxes and for inflation, will remain high, he asserted. And there will be goods available to absorb this purchasing power as production efficiency is raised. In fact, there is ahead a major selling job of raising the standard of living of those large population groups whose incomes are being increased. He pointed out that families moving up from poorer to better income groups must be sold the improved standard of living which their larger incomes allow them. Market potentialities have always been underestimated, he said, and the job to be done is to set to selling sights so as to build up a civilian economy capable of carrying the military and foreign aid load.



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Systems fully supervised including coding contacts which give immediate notification of disarrangement that may occur on circuits.

Available in two general types: NON CODE, and CODED Systems, with many possible modifications.

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Coded, Pull Lever showing completion of downward pull.

Non-Code, Break Glass (Hinged Hammer).

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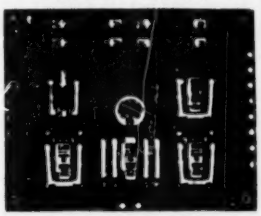
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ELECTRICAL CONSTRUCTION and MAINTENANCE

330 W. 42nd St. New York 18, N. Y.

What is needed now, said A. H. Kessler, IAEL president, in his opening address, is positive planning for continued sales and promotional operations as opposed to a do-nothing policy of waiting to see what is going to happen. Conditions now are about the same as before the last war, and we should profit from the lessons learned then.

According to safety requirements as incorporated in the latest edition of the wiring code, simple logic says that wiring not meeting those requirements is unsafe. Rather a harsh conclusion, admitted J. H. Van Aernam, Niagara Mohawk Power Corp., but quite true if old wiring is over-fused or plugged so that modern appliances will operate. This was the reason why his company embarked, some years back, on an intensive campaign to educate its residential customers to appreciate blown fuses as warnings of unsafe conditions, not as annoyances.

The cost of planned lighting need not be a major stumbling block to a sale, asserted L. E. Johnson, Northern States Power Co. He presented an analysis of 1929, 1939 and 1949 lighting costs in an actual office as proof of his statement. Twenty years ago this office had lighting of 10 ft-c average intensity, in 1939 intensity was raised to 20 ft-c, and today it is 50 ft-c. But with five times the light, the ratio of lighting cost to employee payroll is slightly less today than in 1929.

H. W. Bennett, Employee Relations Division, General Electric Co., told how GE is trying to get over to employees an understanding of the American business system. He demonstrated the technique of group discussion meetings in which the values of our system are explained as against the lack of those values under socialistic and communistic governments.

Officers elected were president, H. P. Wilson, Electrical Institute of the Tri-Cities; vice-president, J. G. Waddell, Electric Institute of Boston; treasurer, R. B. Hubbard, Rocky Mountain Electrical League; secretary, W. G. Hills, Electrical Institute of Washington.

Contractors Enter Lighting Campaign

Philadelphia electrical contractors are now in the midst of their 1950 Cooperative Fall Lighting Campaign. A three-months activity, this campaign began on September 11, and will close December 8. Highlight of the campaign is the Contractor Prize Award Contest, in which $700.00 will be

1 MAN CAN DO THE WORK OF A CREW...

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ONAN *Portable* **ELECTRIC PLANT**

Use Electric Tools on Every Job!

Speed the work, cut costs on installation and maintenance jobs. Lightweight Onan air-cooled electric plants supply electric power anywhere for lights, drills, saws, hammers, spades and other motor-driven tools. Equipped with carrying handles or dolly-mounted. Take 'em anywhere and plug in for all the power you need.

SHIPPED COMPLETE READY TO RUN

Gasoline powered models—A. C.: 350 to 35,000 watts. D. C.: 750 to 15,000 watts. *Diesel plants:* 2,500 to 55,000 watts.

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Model 5CK, 5,000 watts D. C. Weighs only 315 lbs.

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Selection, Application and Economics for Power-Factor Improvement of Industrial Plants

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How to determine the savings in power costs by improvement in power factor.

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How you can tackle almost every other aspect of capacitor and power-factor applications . . . .

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On 10 days' approval, send *Capacitors For Industry*. I will remit $4.50 plus postage or return book postpaid. (Offer not valid outside U. S.)

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awarded, to be divided into 16 separate awards ranging from $75.00 as first award to $12.50 as fourth award. In addition, a Silver Plaque will be

This Cooperative Fall Lighting Campaign is participated in by manufacturers, wholesalers, contractors and utility men. It is sponsored by The Electrical Association of Philadelphia.

The Prize Award Contest has been designed to give equal recognition and reward to outstanding lighting jobs of both large and small size. Jobs eligible for prize awards and plaque competition must be sold during the campaign period. In addition, the jobs must be installed and a report filed with the Electrical Association on or before January 31, 1951.

Commercial prize awards are divided into first, second, third and fourth awards, for both small and large area jobs. First prize is $75, second $50, third $25, and fourth $12.50 for both large and small jobs.

Industrial prize awards are divided into first, second and third awards, for both small and large jobs, with first prize $75.00, second prize $50.00, and third prize $25 in each classification.

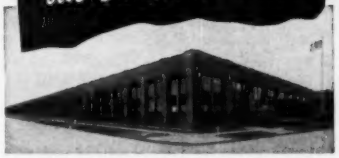
Two awards only are available for exterior lighting installations, first prize $50.00, and second prize $25.00.

Five electrical contractor groups in the Philadelphia area are sponsoring the Contractor Prize Award Contest with cash and promotion. These five groups have set up the prize awards classifications and point system for the silver plaque. They are: Contractors division of the Electrical Association; Penn-Del-Jersey Chapter of the National Electrical Contractors Association; Independent Electrical Contractors Association; Bucks-Montgomery Section, Electrical Association; and the Delaware County Electrical Contractors Association.

Dates Ahead

National Electrical Manufacturers Association—Chalfonte-Haddon Hall, Atlantic City, N. J., Nov. 13-16.
American Standards Association—Annual Meeting, Waldorf-Astoria Hotel, New York, N. Y., Nov. 27-29.
Plant Maintenance Show and Conference—Cleveland, Ohio, January 15-18.
International Heating and Ventilating Exposition—Commercial Museum, Philadelphia, Pa., January 22-26.
American Institute of Electrical Engineers—Winter General Meeting, New York, N. Y., Jan. 22-26, 1951.
National Electric Sign Association—Hotel New Yorker, New York, N. Y., February 5-7.
Edison Electric Institute—17th Annual sales conference, Edgewater Beach Hotel, Chicago, Ill., April 2-5.
Chamber of Commerce—39th Annual meeting, Washington, D. C., April 30-May 2.
National Fire Protection Association—Annual Meeting, Detroit, Mich., May 7-11.
Edison Electric Institute—Denver, Colo., June 4-7.
Illuminating Engineering Society—National Technical Conference, Hotel Shoreham, Washington, D. C., August 26-September 1.

This Steam-Heated Plant Uses 18 AUXILIARY ELECTROMODE *all-Electric* HEATERS



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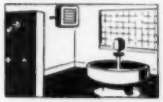
ELECTROMODE All-Electric Heaters are the economical answer to heating problems in old and new plants throughout the country. In the plant shown above, use of thermostatically controlled Electromodes supplied fan-circulated warmth to eighteen hard-to-heat areas, saved piping and eliminated expensive enlargement or forced operation of the central steam system. Here is how it was done:

FACTORY—Underheated areas were eliminated with eight suspension-type Electromodes.

GENERAL OFFICES—A cold north side was heated perfectly with five 5 KW units.

SHIPPING ROOM—Drafts from platform were counteracted with two 5 KW Electromodes.

GUARDHOUSE—This always-cold building was made comfortable with one 1.5 KW portable.



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...users who KNOW buy only the BEST

Ask for them by name...

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NECA CONVENTION REPORT

[FROM PAGE 49]

Carlton B. Tibbetts, president of the Los Angeles Steel Casting Company, reviewed the problem of properly maintaining the electrical system in industrial plants on the basis of his experience with both types of operations—by the electrical department in their own organization and by contract with electrical contractors.

Merle F. Smith, treasurer of the T & S Construction Engineers Inc., Los Angeles said "The relationship between the general contractor and the sub-contractor should be one of mutual helpfulness and not of antagonism. They are dependent one upon the other. A general contractor cannot possibly be a success without dependable sub-contractors, and particularly, the electrical contractor who can do much to make a job a success or a failure."

Mr. Smith urged that subcontractors bid only with responsible general contractors, and vice versa, and to correct the evils of bid shopping and bid peddling, he cited the code of ethics of the Associated General Contractors as containing the pattern for a solution.

Examples of effective application of the NECA promotion program by NECA chapters were presented in a special report by the Milwaukee, Nashville and Rocky Mountain Chapters. E. H. Herzberg, manager of the Milwaukee Chapter, described an intensive promotion effort to promote adequate wiring and a preference for qualified contractors by use of television, radio, newspaper and street car card advertising. J. A. Scheffer, manager of the Nashville Chapter said that some $400,000 worth of new business resulted from the chapter's sponsorship of a display in a local electrical exhibition which was accompanied by newspaper advertising, adoption of the NECA Guarantee Program and the gift of a complete home wiring job. Don Larson, manager of the Rocky Mountain Chapter, Denver, described how his chapter gained important business through a systematic sales approach to architects and public utilities.

General

A tribute was paid to George Andrae of Milwaukee, who has served for almost 25 years as the representative of the electrical contracting industry in code development.

Glenn North of Chicago was awarded the annual NECA Apprenticeship Medal as the nation's outstanding electrical apprentice.

Dr. William D. Stratford, Dean of Men, Weber College, Ogden, Utah, addressed the convention at a luncheon meeting on Wednesday. He spoke on "The Crisis in Free Enterprise" with emphasis on the building trades and construction industry.

The following vice presidents were elected—Alfred V. Bartlett, Sr., Providence, R. I., District No. 1; W. E. Frazer, Philadelphia, District No. 2; D. B. Clayton, Birmingham, Ala., District No. 3; Oliver F. Burnett, Jr., Chicago, District No. 4; Ralph Johnson, Denver, Colo., District No. 8.

Several resolutions were adopted by the convention at the closing session. One was on Regulation X and it instructed the officers of NECA to take immediate steps to make known to the President of the United States and to the heads of governmental agencies concerned with housing and with the enforcement of Regulation X the considered view of the members, requesting the immediate relaxation of the Regulation and withdrawal from consideration of additional regulations affecting multi-family apartments that would otherwise be available to the lower and middle-income wage earners.

Another resolution was passed concerning federal government controls and asking that the Department of the federal government and the Congress of the United States refrain from imposing drastic controls on the construction industry as some of these controls do not appear to be needed or proper under present conditions.

GENERAL MANAGER J. K. Stuessel supervises all engineering, estimating and construction activities of the Wente Construction Co. Inc., electrical contracting firm at Hamilton, Ohio.

What do you pay for a hole . . . ?

Cut costs up to 76% with a KETT TALL REACH WOOD BORER

In a contractor's test, using hand brace and bit and ladder, average time for a hole was 21 seconds. With the KETT "Tall Reach" Wood Borer, same hole took 5 seconds! That means you can do a four-day job in one day, with this amazing tool.

The KETT "Tall Reach" Wood Borer is a rugged unit, built for continuous hard use, yet weighs less than 15 lbs. with ten foot extension which permits drilling, without a ladder, any place...at any angle. Capacities: up to 3" in wood, also drills metal and masonry. Ideal for electricians, plumbers and all contractors. See it at your dealer or write for Bulletin F-11.

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ELECTRIC HAMMER

A power tool of many uses for electrical contractors and plant maintenance work. Hammer is detachable from drill member. Drills concrete ¼" to 1⅛" diameter, metal to ⅝" and wood to ⅞". Forged hammer tools for chipping, channeling and cutting masonry materials. Attachment for right angle drilling.

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THE Jacques
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This light-weight steel frame cutter is a bear for punishment. Many advantages of larger, heavy duty machines. 40" balanced blade. Rigid, easy setting receiver gauge. Write for Descriptive Literature.

HOBBS MANUFACTURING CO.
32 Salisbury St., Worcester, Mass.
EST. 1882

SELL FOUR WORDS

[FROM PAGE 57]

tion. In other words, profit through greater output and reduced expense."

It was clumsy and halting, but Farrell knew he was on the right track. He tried the next point: "These motors are lighter in weight and smaller in size than the ones you are using now. This means ease in handling and installation, with less risk of injury to your men. Not only do they bring you more convenience and safety in shop operations, but again you save in time and labor."

Next day, nervous as a bride, he called on Jacobs again and followed his planned sales talk. This time the purchasing agent listened closely, making notes as Farrell talked. Then the purchasing agent asked a number of detailed technical questions which called out Farrell's thorough knowledge of his product. At the end he said he would take another look at the quotations.

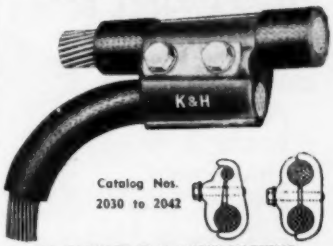
When Farrell finally got the order, it suddenly occurred to him that price had scarcely been mentioned. The Acme men had been so much more interested in what the motors would do for their production that price had become secondary.

Even more gratifying than the order itself was the knowledge that his common-sense method had worked. He knew it would work again, and could be applied in any contract situation to any product he handled. All he needed to do was to organize the features of the product in terms of the buyer's need, and then express them as benefits with the phrase "This Means to You".

TECHNICAL ASSISTANT secretary of IAEI Robert A. Peterson (left) discusses Western Section convention with immediate past-president W. J. Alcock of Underwriters' Laboratories.

K&H Solderless Terminal LUGS — A SIZE and TYPE for every need — K&H Solderless CONNECTORS

UNIVERSAL PARALLEL TAP CONNECTOR



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The tightening bolts exert an even pressure on both wires regardless of size. The clamping surface is large and covers a contact area several times greater than the cross-section area of the wires themselves. Locking feature insures a permanent connection.

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Complete with "SNAP-ON" Studs (Patented)

Try these new FAST•LOK adjustable BAR-HANGERS on your next job. You'll never use any other type bar-hanger.

This is the ONLY adjustable bar-hanger not requiring disassembly and reassembly to attach to outlet box.

SEE YOUR ELECTRICAL DISTRIBUTOR FOR DEMONSTRATION OR WRITE FOR BUL. FL-2

The FAST-LOK MFG. CO.
Ash Street at Bedford
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Sales Offices in All Principal Cities

Special Pre-Christmas Offer

YOUR NAME STAMPED IN GOLD—FREE

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Without cost to you we will stamp your name, or a friend's name, on the front cover of any book ordered from this advertisement.

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By Arthur L. Abbott

This Handbook gives a wealth of information from the practical angle on getting jobs done according to latest code requirements. It saves delay in starting jobs . . . saves time and money in avoiding false starts, errors and violations. It reduces a maze of rules to a logical and understandable system, explaining how the code applies to commercial buildings—homes—factories—hazardous locations—signal systems—high-voltage equipment — television equipment—motor installations, etc. now contains 1949 supplement to the code. **Sixth edition, 633 pages. 418 illustrations, $4.00.**

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Contains hundreds of detailed descriptions, rules, methods, pictures and practical data to help you install, maintain and operate electrical equipment, with everything thoroughly indexed for finger-tip reference. Includes complete data-on wires and cables, splicing, motors, capacitors—together with recent advances in electronic tubes and circuits and their applications in industry. **Sixth edition, 1734 pages, 1372 illustrations, $6.00.**

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.....Croft—American Electricians' Handbook—$6.00

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MASS PRODUCTION WIRING METHODS

[FROM PAGE 55]

arrangements and installation techniques. For example: 18 carloads of conduit were purchased under a single order, shipped from Pittsburgh to San Pedro and Long Beach, and finally trucked directly to the job. The wire order was also a large one (700 miles) with deliveries made on 5000-foot reels rather than on the smaller 500-foot spools.

In organizing the job, five working areas were established with four buildings in each area. Each area was placed under the jurisdiction of a foreman who worked directly with the project manager and construction superintendent. With their offices based in conveniently-located trailers connected by telephone to project headquarters, storage areas and prefab shops, foremen could order materials, speed special services, check construction details and discuss installation problems without leaving their assigned areas.

During the first few weeks, every installation crew handled every type of electrical layout. However, it became quickly apparent that the scope of the job justified specialization. The result was that four typical crews were organized to complete the electrical work in apartments, on lobby floors, in basements and in the seven 2-story community garages on the property.

Installation Methods

Practical installation methods were quickly developed. For example: one was designed to hold adjacent upturned runs in their related position until secured by concrete floor slabs.

Wire pulling was also facilitated through the use of a specially-constructed four-wheel rubber-tired truck capable of holding three 5000-foot wire reels. Constructed with a working platform at a height convenient for wiremen working in ceiling outlets, the use of the truck eliminated the necessity of erecting auxiliary scaffolding for this operation. Also, with its easy mobility, the truck could be rolled directly to pull boxes, panelboard or switchgear locations.

The significance of this project rests with two Ms; Management and Methods. It is an outstanding example of precise scheduling, dove-tailed installation operations, efficient prefabrication and practical wiring techniques. It is an enterprise reflecting justified credit to The California Electric Construction Company.

E-M Service Masts are the perfect support for service wires on ranch type houses and low commercial structures that do not provide sufficient ground clearance to comply with National Electrical Code requirements (2322 a. & b. 1947).

E-M Service Masts are neat rugged units that require no guy wires. They look good, are hot galvanized to last a lifetime. Developed in cooperation with utility engineers and electrical contractors.

WRITE FOR BULLETIN 51

Electrical Manufacturing Co.
Pole Line Hardware
152 Angell St., BATTLE CREEK, MICH.

ADVERTISEMENT

PLANS CONSTANT USE . . .

. . . of this Buying Information

Mr. Louis A. Ehrlich, Owner of the Superior Electric Co., of Muncie, Indiana, finds the McGRAW-HILL PRE-FILED ELECTRICAL CATALOGS a valuable source of reference in the conduct of his business. In a recent letter, Mr. Ehrlich said: *"The new NEMA section in the front of this new Catalog will be used by us many times in the future."*

Leading manufacturers pre-filed product information in ELECTRICAL CATALOGS that assists the Catalog user in his selection of reliable sources of electrical equipment and supplies. There is also a comprehensive Directory of Manufacturers, which includes a separate cross-referenced listing of trade names and company addresses.

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BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count one line additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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The advertising rate is $9.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

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